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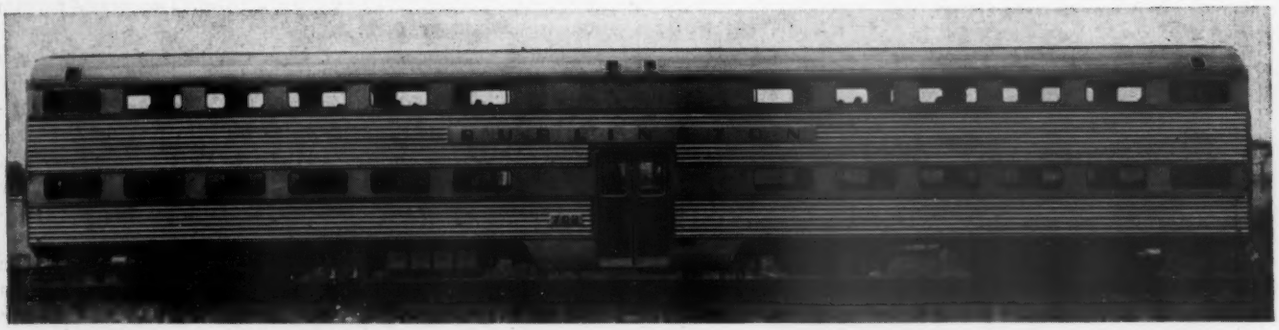


# Burlington Gallery Suburban Cars

## Upper levels seat 52 passengers; the main floor 96—Entrance through center vestibule — Air conditioned — Built by Budd

THIRTY gallery-type suburban coaches are being delivered to the Chicago, Burlington & Quincy by the Budd Company, Philadelphia, Pa. All but five of the cars are without toilets and each seats 148 passengers; the five cars with toilets seat 145 passengers each.

The construction of the stainless-steel Shotwelded cars follows the current practice of the builder in which the side structure serves as the shear members and the roof and floor as the chord members of a modified plate girder. Center sills, floor and roof are of stainless steel. The end underframe units, including draft-sill extensions, and the body bolster are of arc-welded alloy steel, completed with an alloy cast-steel end sill and coupler-carrier support. There are no skirts below the side sills, except where they form a smooth, curved connection between the vestibule step well and the side of the car.

The vestibule and steps are in the middle of the car body, from which passengers enter either half of the car. Passengers are seated on two levels, with double seats on the main floor and single seats in the galleries. Compact stairways on each side of the car adjoin both sides of the center vestibule, leading from the aisle entrance to the galleries over the main-floor seats. A passageway, protected by a railing, extends alongside the single seats in each gallery.

The car floors in the seating space are of plywood. The lower floor is ½ in. water-resistant material, secured directly by blind rivets to the tops of the flanges of the stainless-steel subfloor structure. The gallery floors are 1 in. plywood, faced on both sides with metal. The floors on both levels are covered with 3/16 in. rubber tiles. The vestibule floor and steps, the gallery stair steps and landings, and the floor inside the car up to the partition at the first seats are made of stainless-steel anti-slip plates.

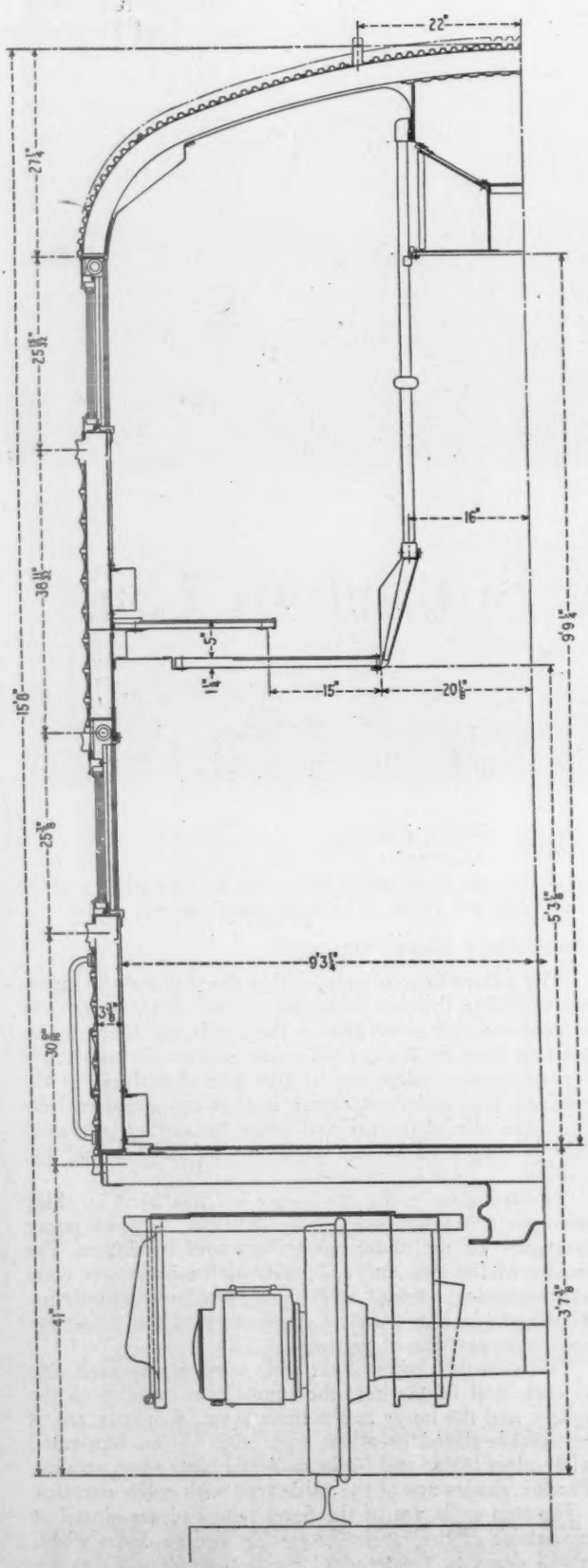
### No Gallery Floor Supports

The gallery floor is supported at the side wall by brackets welded to the side posts and on the aisle side by truss members which serve also as the hand rail. Columns extend up from the truss panel points and are secured at the top to the roof structure to give lateral stiffness to the railings. The gallery structure is thus supported entirely from the side of the car and from the railing trusswork that is supported by the partitions at each end of the gallery.

All insulation in the car bodies is Ultralite, 3 in. thick throughout in roofs, sides, ends and floor. Asbestos paper is applied on the under side of the roof insulation. The insides of the side and end walls of the passenger compartments are covered with sound-deadened aluminum. Aluminum is also used on the ceiling of the passenger occupancy sections of the car.

There are two rows of six wide windows on each side of each half of the car, the upper row opening to the gallery and the lower to the main floor. Windows are of the double-glazed breather type with ¼ in. laminated safety glass inside and ¼ in. polished plate glass outside. Window shades are of the cable type with roller curtains.

The step wells are of the fixed type and are closed at the outside of the car by bi-parting sliding doors which extend down to the tread of the bottom step. These are operated by National Pneumatic door engines from switches in a box attached to the vestibule wall above the stanchion just inside the passenger entrance opening.




Cross-section of the Burlington gallery car

These switches are arranged so that the buttons control the opening and closing of a group of cars from a single station.

Body end doors are also of the sliding type and are fitted with weather stripping. The inside aisle doors between the center vestibule and each passenger compartment on the lower floor are bi-parting sliding doors. These are manually operated and are provided with holders to retain the doors in the open position. The doors remain closed without a latch.

There are 12 walkover type double seats along each side of the aisle in each half of the car. In each gallery are 11 single seats similar to the double seats on the main floor, except that there is no arm rest on the aisle side. At the end of each gallery against the end wall of the car is a fixed double seat. Seat cushions are of hair and spring construction, with padded back cushions. Upholstery is of plastic material.

There are no parcel racks above the double seats on the main floor of the car. Under three of the gallery stairs in each car, however, is a space approximately 18 in. by 30 in. for luggage shelves. The control and switch lockers are housed in the similar space under the fourth stairway. In the gallery continuous closed-type parcel racks are placed along each side of the air distribution duct over the center aisles.

## Air Conditioning and Heating

Each car is equipped with two Waukesha propane-driven ice engines and two overhead Trane evaporators. Each overhead unit has a capacity of 6½ tons and is equipped with supplementary heating coil and blower. The heating coil is removable without disturbing the cooling coil. The evaporator and blower units are located above the ceiling over the center entrance vestibule.

Fresh air enters the car through four screened openings in the sides of the roof above the entrance doors. It passes through two Farr filters inside each opening before entering the plenum chamber. Each blower has a capacity of 2,400 cu. ft. per min., of which 600 cu. ft. is fresh air. The air is discharged into the upper level from the central overhead duct. It passes through branch ducts at each end of each compartment to longitudinal ducts underneath the gallery floor, from which it is discharged through slotted openings. Air is forced out of the car through two grills in the car sides at each end which discharge through two static-type ventilators.

The cars are heated by fin-tube floor radiators along the sides on both levels, controlled by Vapor single-tube thermostats. The cooling thermostats have three settings: 71-73 deg.; 74-76 deg., and 78-80 deg.

## Electrical Equipment

These cars receive their electric power supply from generators mounted on a power car directly behind the locomotive. Distribution is through a loop system train line of three wires, suitable for transmission of 61-volt d.c.

The battery is an Exide type MVAHT-13 of 213 amp. hr. nominal capacity at the eight-hour discharge rate. It is used only for ice-engine starting and layover heat control. All lighting is incandescent. The lighting of the passenger space in the car is by center ceiling lights and by reading lights over each seat.

## Four-Wheel Trucks

The cars are carried on four-wheel trucks with a wheel base of 8 ft. 6 in. Frames and bolsters are alloy-steel

**Parcel racks for the gallery seats are over the center aisle ceiling**

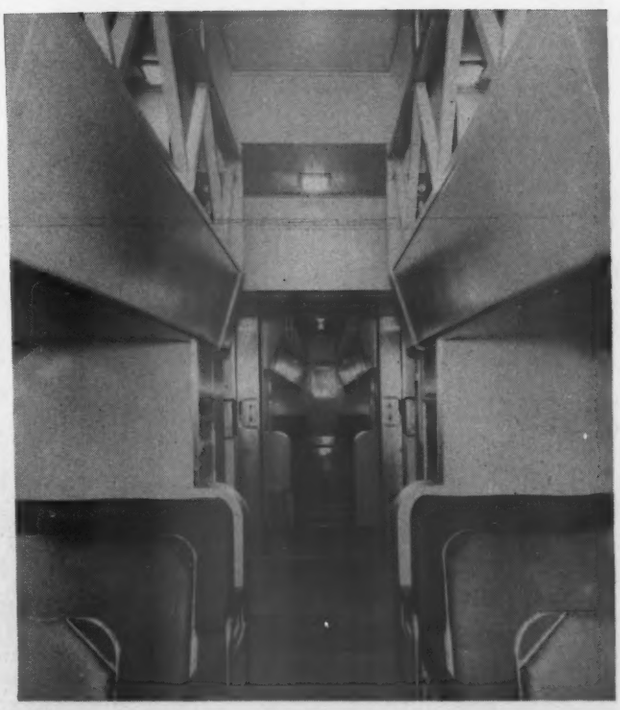
castings. The single equalizers are forged. Bolsters have roll stabilizers and longitudinal anchor rods. All springs are helical and Houdaille shock absorbers are applied at the ends of the bolsters. Journals are 6 in. by 11 in., fitted with Timken roller bearings and wheels 33 in. in diameter of high-carbon rolled steel. Treads are semi-cylindrical. Rubber pads are placed between the center plates, under the side bearings and at the ends of the bolsters. Rubberized fabric pads are placed between the ends of the equalizers and the tops of the journal boxes.

The trucks have clasp brakes of the Unit-cylinder type. A lever type hand brake mounted on a collision post at one end of the car operates through the clasp brakes on the one truck adjacent to the brake.

The air brakes are of the modified H.S.C. type with pneumatic control, furnished by Westinghouse. The braking ratio, based on the ready-to-run weight, is 150 per cent at 100 lb. cylinder pressure. Provision is made for the later application of the straight-air pipe.

In order to permit operation of the angle cock without going under the end of the car, there is a loop in the end of the brake pipe. In this loop is located the angle cock, thus bringing it close to the side of the car.

The cars are fitted with tightlock couplers and Waughmat draft gears. The ends of the cars have face plates of stainless steel and single-fold inner diaphragms. A canvas boot at the bottom of the diaphragm aids in closing the openings at each side of the foot plate.



**Looking through the vestibule**

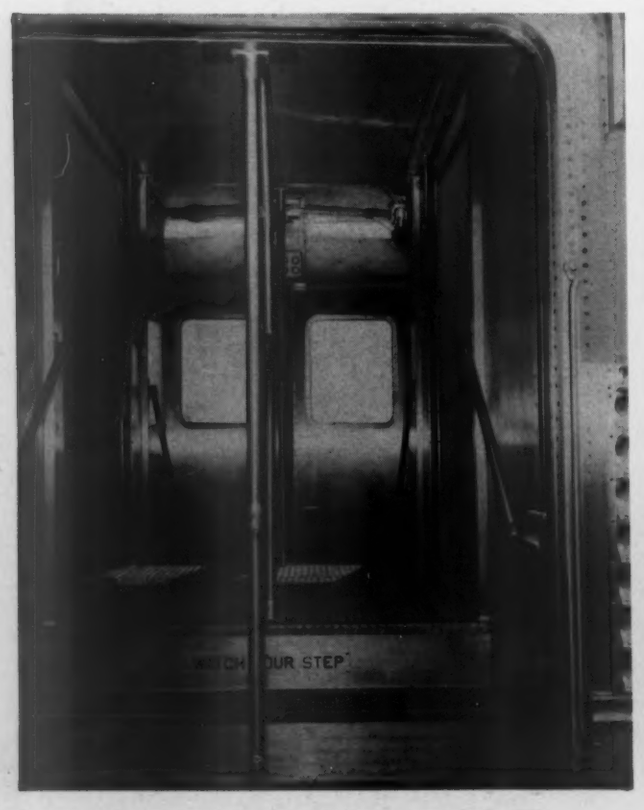
## PARTIAL LIST OF MATERIALS AND EQUIPMENT ON THE C. B. & Q. GALLERY-TYPE SUBURBAN CARS

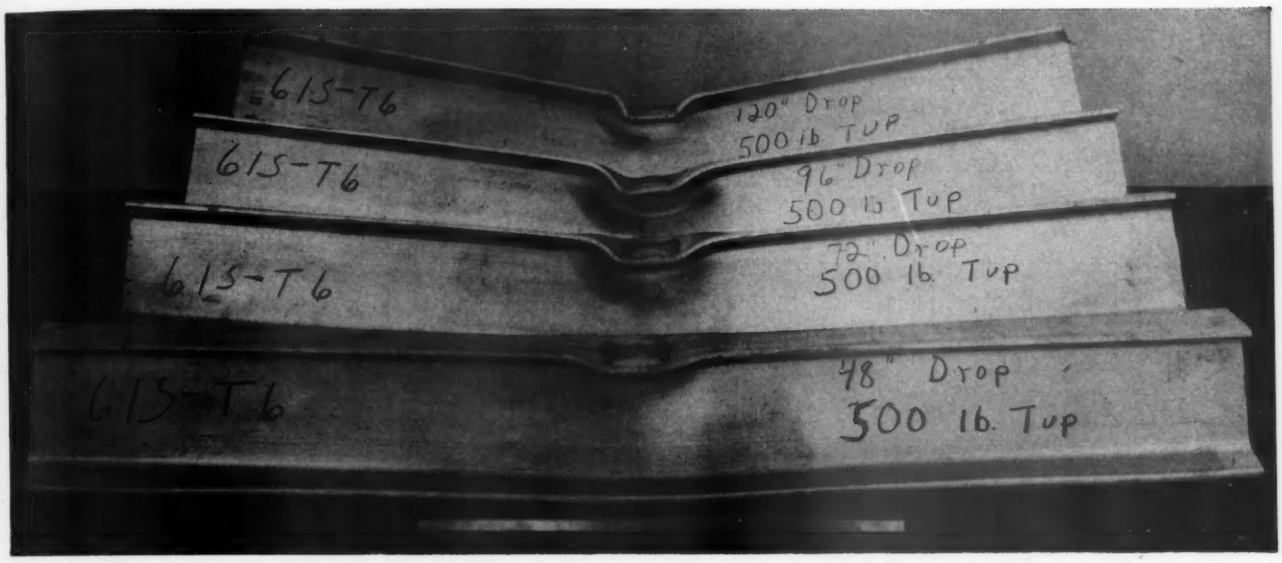
| | |
|---|---|
| Underframe assembly | Youngstown Steel Car Corp., Niles, Ohio |
| Blind rivets | Cherry Rivet Co., Los Angeles, Calif. |
| Wheels and axles | Standard Steel Works Div., Baldwin Locomotive Works, Burnham, Pa. |
| Journal bearings and boxes | Timken Roller Bearing Co., Canton, Ohio |
| Swing hanger pins | Manganese Steel Forge Co., Philadelphia, Pa. |
| Truck frames, bolster and roll stabilizer | General Steel Castings Corp., Granite City, Ill. |
| Shock absorbers | Houdaille Hershey Co., Houde Engineering Div., Buffalo, N. Y. |
| Truck center pin | W. H. Miner, Inc., Chicago |
| Sound deadening | J. W. Mortell Co., Kankakee, Ill.<br>United States Rubber Co., New York |
| Coupler and uncoupling mechanism | National Malleable & Steel Castings Co., Cleveland, Ohio |
| Draft gear | Waugh Equipment Co., New York |
| Draft gear yoke | National Malleable & Steel Castings Co., Cleveland, Ohio |
| Side stem bumper pads | Fabreeka Products Co., Boston, Mass. |
| Air brakes, hose and couplers | Westinghouse Air Brake Co., Wilmerding, Pa. |
| Brake shoes; brake-shoe keys | American Brake Shoe Co., New York |
| Truck brakes | American Steel Foundries, Chicago |
| Hand brakes | National Brake Co., New York |
| Insulation—roof, sides, ends, floor | Gustin-Bacon Manufacturing Co., Kansas City, Mo. |
| Waterproof adhesive | Acorn Refining Co., Cleveland, Ohio |
| Vestibule flooring | Alan Wood Steel Co., Conshocken, Pa. |
| Vestibule enclosures — inner diaphragm, canvas | Morton Manufacturing Co., Chicago |
| Vestibule curtains, side | Morton Manufacturing Co., Chicago |
| Metal-covered plywood — partitions and doors | Haskelite Manufacturing Co., Grand Rapids, Mich.<br>Met-L-Wood Corp., Chicago |
| Windows; window-shade mechanism | Adams & Westlake Co., Elkhart, Ind. |
| Window glass | Pittsburgh Plate Glass Co., Pittsburgh, Pa. |
| Window shade material: | |
| Interior surface | Collins & Aikman Corp., New York |
| Exterior surface | Ionna Western Mills Co., New York |
| Door engine | National Pneumatic Co., Rahway, N. J. |
| Door closer (5 cars only) | Yale & Towne Manufacturing Co., Stamford, Conn. |
| Locks; general hardware, etc. | H. S. Getty & Co., Philadelphia, Pa.<br>Loeffelholz Co., Milwaukee, Wis.<br>Rostand Manufacturing Co., Milford, Conn.<br>Yale & Towne Manufacturing Co., Stamford, Conn. |
| Coach seats | (20 car sets, including five cars with toilets) S. Karpen & Bros., Chicago<br>(10 car sets) Coach & Car Equipment Co., Chicago |
| Seat coverings | (15 car sets) Goodall Fabrics, Inc., New York<br>(15 car sets) B. F. Goodrich Co., Akron, Ohio |
| Paints | Pittsburgh Plate Glass Co., Pittsburgh, Pa. |
| Underfloor paint primer | Interchemical Corp., Finishes Div., Newark, N. J. |
| Batteries | Electric Storage Battery Co., Philadelphia, Pa. |
| Wire and cable | Okonite Co., Passaic, N. J. |
| Train line receptacles and jumpers | Pyle-National Co., Chicago |
| Air conditioning system; evaporators and blowers | Trane Co., La Crosse, Wis. |
| Fuel cabinets, ice engines | Waukesha Motor Co., Waukesha, Wis. |
| Fuel cylinders | Pressed Steel Tank Co., Milwaukee, Wis. |
| Fresh-air filters | Farr Co., Los Angeles, Calif. |
| Recirculated air grills; door grills | Barber-Colman Co., Rockford, Ill. |
| Heating system and control panels | Vapor Heating Corp., Chicago |
| Blind rivets (piping, brackets, etc.) | Clarke Equipment Co., Buchanan, Mich. |
| Steam train-line and steam-line insulation | Johns-Manville, New York |
| Fire extinguishers | Phister Manufacturing Co., Cincinnati, Ohio |
| Hoppers | Dayton Manufacturing Co., Dayton, Ohio |
| Paper holders | Scott Paper Co., Chester, Pa. |

There are four schemes of interior decoration. All employ tan and cream for walls and ceilings, and rust and green window shades. In two, the seat covering is plastic upholstery in green and the floor tiles green and ivory, or rust and ivory marbleized. The others have plastic upholstery in rust and rust and ivory, or green and ivory floor tiles.

The cars are 85 ft. in length, coupled, have a maximum height above the rail of 15 ft. 8 in., and weight 132,380 lbs., each, ready to run.

**Left: Side doors open pneumatically—Control switches are over the doors in the background —Right: Looking toward the end of the car—Luggage is stored under the gallery stairway**






**Examples of crushing and bending tests of thin and thick material—These deformations are without fracture**

# An Aluminum Alloy in Car Construction

## 61S-T6, a magnesium alloy, is corrosion-resistant, ductile, workable, and increases in strength at low temperatures

***By E. C. Hartmann, G. B. Hauser and R. L. Moore****

VARIOUS aluminum alloys, both heat treated and non-heat treated, have been used to save weight in railway freight- and passenger-car construction. The heat-treated alloys used in the first applications were of the duralumin type, in which the principal alloying constituent was copper. The alloys in this category were 17S-T and A17S-T. During the 1930's there were introduced into the railway car field other heat treated alloys of superior resistance to corrosion, in which the principal alloying constitutent was magnesium silicide rather than copper. The principal one of these alloys, which is still most widely used, is aluminum alloy 61S-T6, having the following nominal composition:

| | Per cent |
|---|---|
| Magnesium | 1.00 |
| Silicon | 0.60 |
| Copper | 0.25 |
| Chromium | 0.25 |
| Aluminum | 97.90 |

Alloy 61S-T6 may be characterized as a medium-strength structural material with excellent resistance to corrosion. In order to achieve maximum properties, the material is given both a solution heat-treatment and a precipitation heat-treatment similar to those applied to many of the other high-strength aluminum alloys. The material has good ductility and workability and is available in all of the usual commercial forms such as sheet, plate, extruded shapes, rolled shapes, rod, bar, rivets, etc.

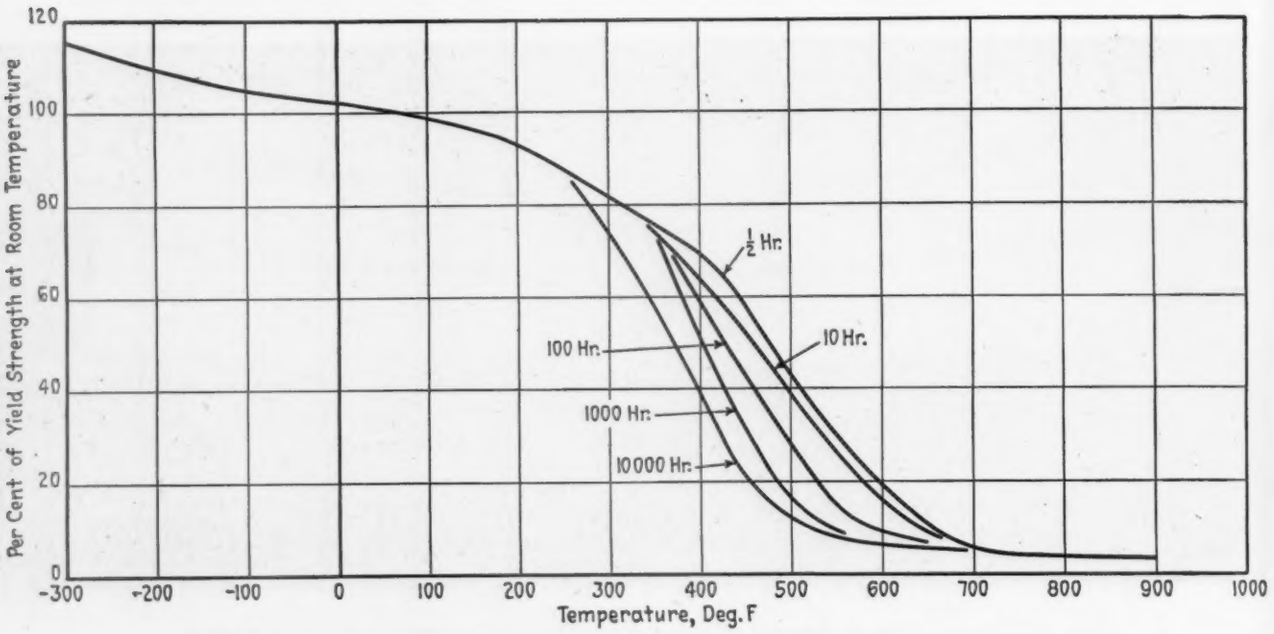
### History

Aluminum alloy 61S-T6 was introduced some fifteen years ago and has enjoyed a very rapid acceptance in many fields of construction. Because of its excellent resistance to corrosion, it has become the most widely used lightweight structural material in ship construction, especially for deckhouses, life boats, stack enclosures, etc.[1]

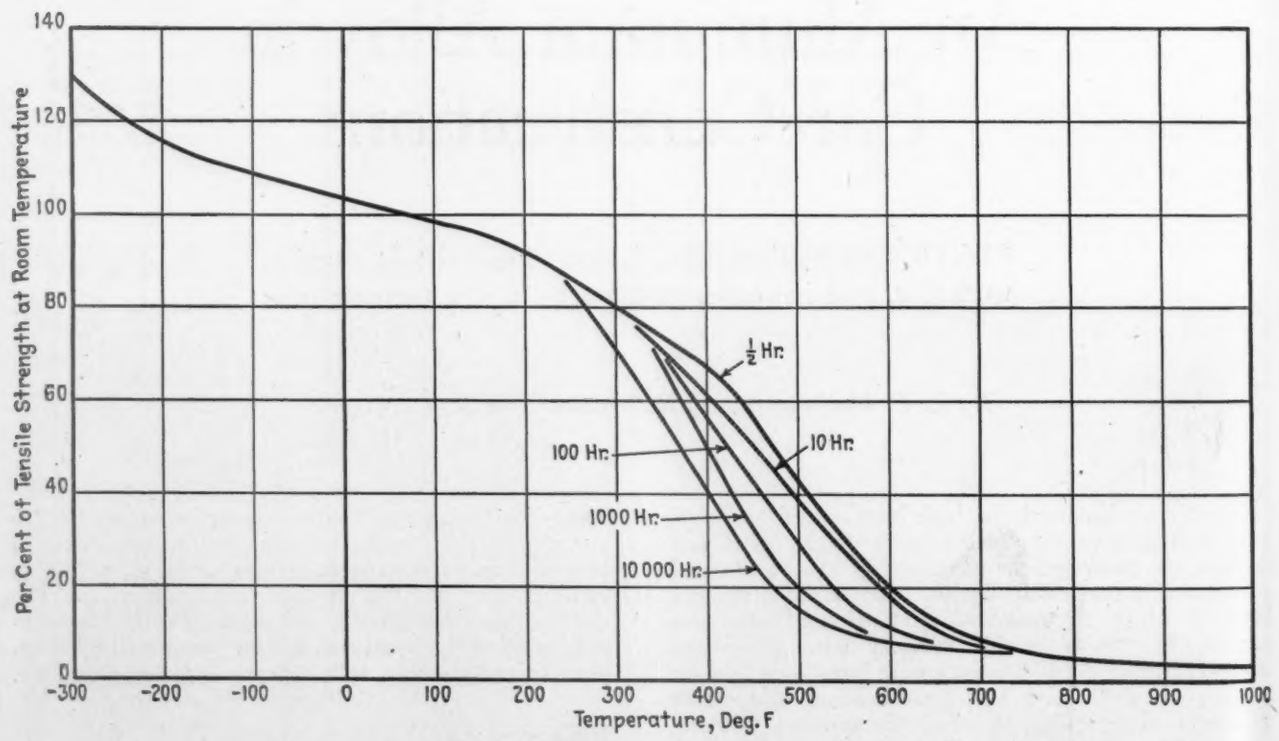
The first application of 61S-T6 for rolling stock was in

* Aluminum Research Laboratories, Aluminum Company of America.

[1] The Resistance of Aluminum-Base Alloys to Atmospheric Exposure, by E. H. Dix, Jr., and R. B. Mears published in Symposium, American Society for Testing Materials, pages 57 to 71, February 27, 1946. Performance of Aluminum Alloys in Marine Environments, by C. J. Walton and E. T. Englehart, presented at the November 30, 1949, meeting of The Society of Naval Architects and Marine Engineers.




**How yield strength varies with temperature, in per cent of strength at room temperature**

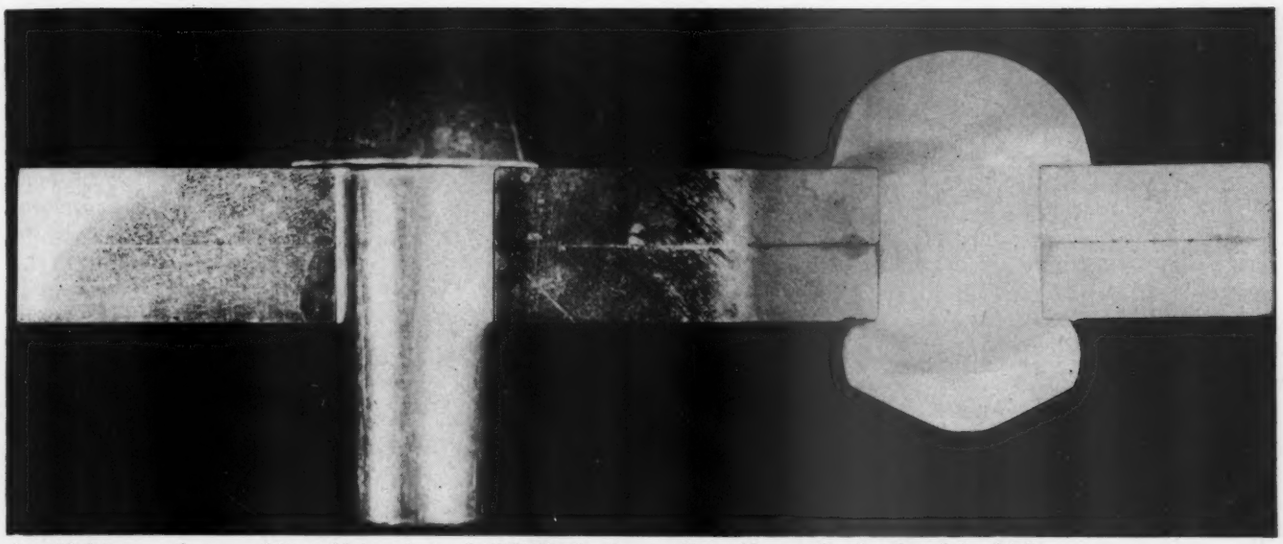



**Variation of tensile strength with variations in temperature, in per cent of strength at room temperature**

a street car built for the Brooklyn and Queens Transit Corporation by the Clark Equipment Company in 1935. In spite of two major accidents, this car is still in active service and is in excellent condition. Another early application was the three-bodied, four-truck subway car that was placed in operation by the New York Rapid Transit Corporation in 1939. Five additional car bodies were built in 1940 and are still in service.

In 1938, two tank cars of 8,000 gallons capacity were built by General American Transportation Corporation of welded 61S-T4 construction. In May, 1940, two riveted tank cars of 61S-T6 were built for the transportation of nitric acid. All four of these cars are still in service, as are some 300 similar cars subsequently built.

In 1944, the Missouri Pacific purchased 25 70-ton hopper cars with 61S-T6 superstructure from the American Car and Foundry Company. These cars are still in service hauling coal, sulphur and other materials. Eleven



**A cold-driven and an undriven ¾-in. rivet of 61S-T6 aluminum alloy—No cracks developed in driving**

additional hopper cars, two refrigerator cars and 20 box cars with aluminum superstructures of 61S-T6 have also been built. The Roberval and Saguenay is operating in North American interchange a box car in which the Canadian equivalent of 61S-T6 alloy is used throughout both superstructure and underframe.

### Mechanical Properties

Since acceptability of structural materials for railway applications is based on a consideration of mechanical properties, some discussion of these properties will be of interest. Alloy 61S-T6 has the following typical properties:

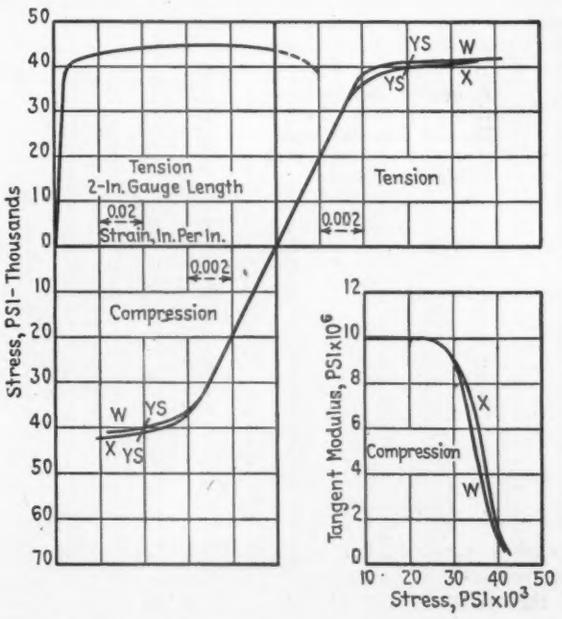
| | |
|---|---|
| Tensile strength, lb. per sq. in. | 45,000 |
| Yield strength (Offset, 0.2 per cent), lb. per sq. in. | 40,000 |
| Elongation in 4 diameters (round specimen), per cent | 17 |
| Shearing strength, lb. per sq. in. | 30,000 |
| Modulus of elasticity, lb. per sq. in. | 10,000,000 |
| Modulus of rigidity, lb. per sq. in. | 3,800,000 |

A typical stress-strain curve for the material is shown.

Aluminum alloy 61S-T6 in its various commercial forms is covered by A.S.T.M. and Government specifications. The specified minimum yield strength (offset, 0.2 per cent) is 35,000 lb. per sq. in. in all of the forms in which the material would be used in railway car construction. The corresponding specified minimum tensile strength is 42,000 lb. per sq. in. for all such products except extruded shapes, in which case it is 38,000 lb.

### Properties at Various Temperatures

The properties listed in the foregoing paragraph are those established at room temperature. The changes in properties with changes in temperatures are shown in one of the graphs. Because of the well known tendency for structural steel to become notch brittle at low temperature, much attention has been focused recently on the low-temperature properties of metals. Like other wrought aluminum alloys, however, alloy 61S-T6 is completely free from any tendency to lose strength or ductility at low temperatures. In fact, there is an increase in strength with decrease in temperature as shown




**Stress-strain curves of aluminum alloy 61S-T6**

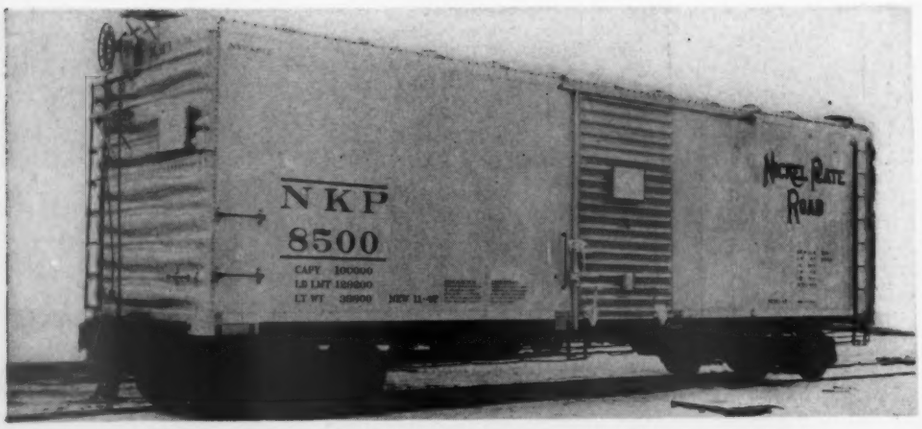
in the curves. Further information on this subject may be found in the literature.[2]

One of the outstanding advantages of alloy 61S-T6 over the earlier copper-bearing heat-treatable alloys is that it retains its excellent resistance to corrosion even after being subjected to intentional or unintentional heating. Such heating may be severe enough to lower the mechanical properties without affecting the resistance to corrosion.

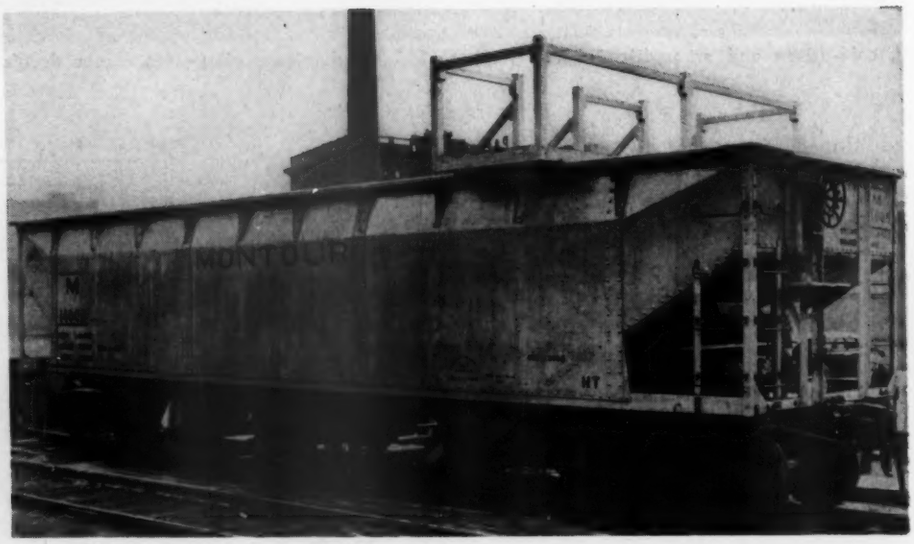
### Welding

Alloy 61S-T6 is the most widely accepted of the heat-treatable aluminum alloys for welded construction. As

[2] A Summary of Results of Various Investigations of the Mechanical Properties of Aluminum Alloys at Low Temperatures, by E. C. Hartmann and W. R. Sharp, National Advisory Committee for Aeronautics Technical Note No. 843, May, 1942. A Review of Information on the Mechanical Properties of Aluminum Alloys at Low Temperatures, by K. O. Bogardus, G. W. Stickley and F. M. Howell, National Advisory Committee for Aeronautics Technical Note No. 2062, May, 1950.




This car, the superstructure of which is of 61S-T6 material, was built by the railroad in its own shops



A hopper car built by the American Car & Foundry Co., the superstructure of which is of 61S-T6 material

would be expected, the heat of welding adversely affects the mechanical properties of the material in the vicinity of the welded joint, but there is no adverse affect on resistance to corrosion. The inert gas-shielded arc method of welding (without the use of any flux) is the preferred type. The following tentative minimum tensile strengths across the weld are based on many tests of inert gas-shielded arc-welded butt joints in 61S-T6 plates, in which there has been no reheat-treatment following welding:

| | |
|---|---|
| Thicknesses of ¼-in. and less, lb. per sq. in..... | 28,000 |
| Thicknesses of 5/16-in. and ⅜-in., lb. per sq. in.. | 26,000 |
| Thicknesses of 9/16-in. and over, lb. per sq. in... | 24,000 |

## Ductility

Ductility is a highly elusive quality which cannot be adequately defined in terms of any combination of existing mechanical properties. Nevertheless, ductility is an extremely important quality of metals for many applications, particularly those which may be subjected to accidental overloads in service and where brittle-type fractures might endanger life or property. The ductility of 61S-T6 alloy is demonstrated by its satisfactory performance in railway freight-car applications previously mentioned. As a further demonstration of the ability of this alloy to withstand severe deformation, however, some photographs of typical test samples have been included in this paper. Reference to these is made below.

Aluminum alloy 61S-T6, in addition to its many other wrought forms, is regularly supplied in the form of rivets. Such rivets are driven either hot or cold. Obviously, no material lacking in ductility could be seriously considered for cold riveting. An example of a ¾-in. diameter 61S-T6 rivet is shown upset at room temperature using a conventional squeeze riveter. Upsetting of the character shown is regularly accomplished without any head cracking difficulties.

One of the illustrations shows a number of examples of thick and thin sections subjected to compression and bending tests at room temperature; these illustrate the ability of the material to withstand deformations without fracture.

A series of 4-in. I-beams of 61S-T6 alloy are also shown. These were subjected to single-blow impact tests on a 30-in. span, using a 500-lb. weight dropped from various heights. The extreme deformations developed in the beams during these tests are noteworthy. None of the beams developed any fractures in the material.

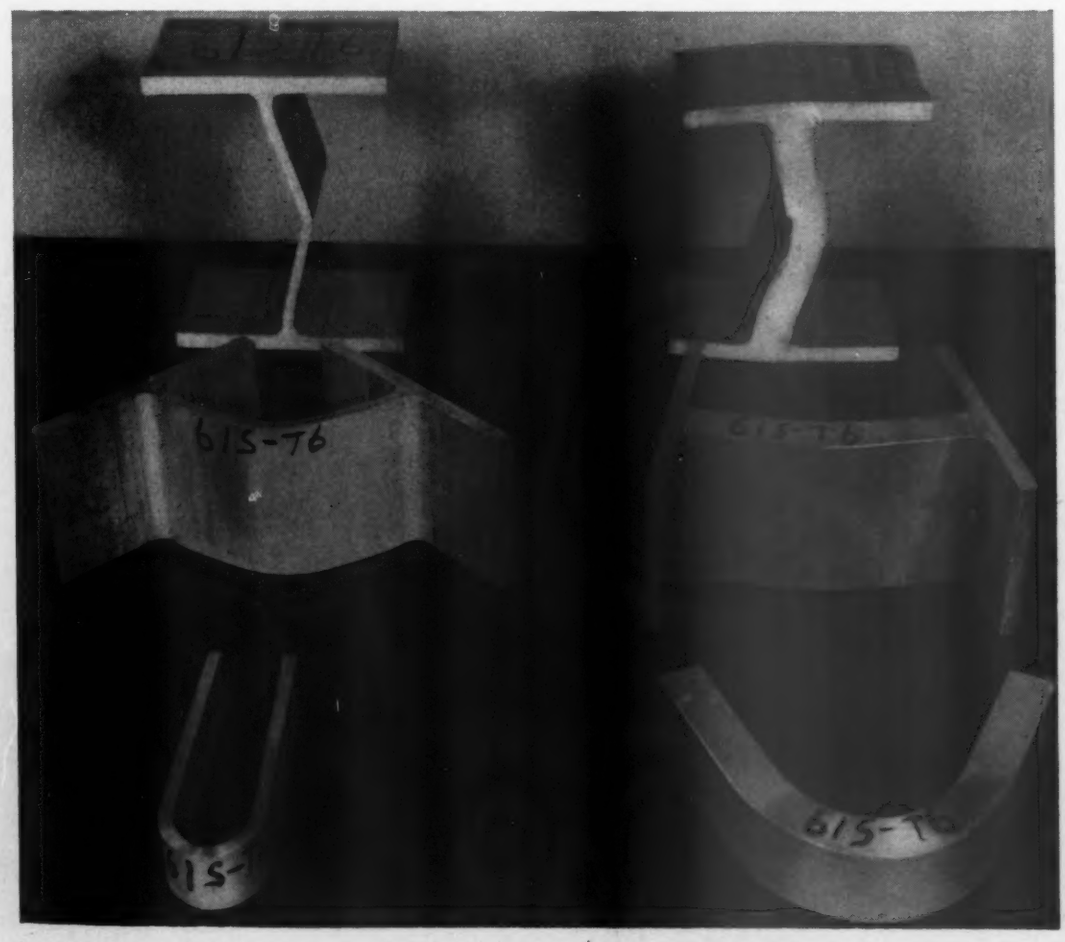
## Workability and Yield Strength Ratio

Any metal having the high degree of ductility described in the preceding section is, of course, capable of standing considerable cold forming. Many operations such as joggling, off-setting, etc. and regularly accomplished at room temperature in alloy 61S-T6. For more severe forming, the workability may be increased by the application of controlled heat.

While quite workable in its final heat treated condition (T6 temper), the alloy is even more workable in its lower strength, solution heat-treated temper (T4 temper). This permits more severe cold forming than would otherwise be possible. The precipitation heat-treatment, which converts the T4 temper to the T6 temper, is a low-temperature aging treatment (6 to 10 hrs, at 350°F) that can be accomplished without elaborate equipment and with complete freedom from warping.

Despite the evidence of ductility and workability indicated by the above examples, as well as by numerous applications in freight cars, alloy 61S-T6 has not been used in railway passenger car construction. This situation exists because the ratio of yield strength to tensile strength for this material normally exceeds the limiting value of 0.80 set up in paragraph 2F of the Specifications of the Association of American Railroads for the Construction of New Passenger Equipment Cars. Although this 80 per cent rule was established to insure a reasonable degree of ductility in railway passenger-car structural materials, it seems quite evident that for aluminum alloy 61S-T6, at least, the ratio of yield strength to tensile strength alone is not adequate for judging such an elusive quality as ductility.

Serious attempts have been made to alter the heat-treatment and composition of 61S-T6 in an effort to reduce the yield strength to a value less than 80 per cent of the tensile strength, thus meeting passenger-car specifications while still retaining the many desirable characteristics of this alloy. Unfortunately, anything that lowers the yield strength also seems to lower the tensile strength, and anything that raises the tensile strength also seems to raise the yield strength so that the ratio tends to remain approximately constant. A modified heat-treatment was adopted several years ago for extruded shapes which results in the material known as 61S-T62. This material consistently maintains a ratio of yield strength to tensile strength below the Association of American Railroads limiting value. The penalty paid for success in this development, however, was a reduction in minimum yield strength of 9,000 lb. per sq. in. (from 35,000 to 26,000 lb. per sq. in.). In view of the excellent performance of unmodified 61S-T6, this reduction seems too great a loss in yield strength to tolerate merely in order to meet an arbitrary specification rule. Consequently, it has not been possible thus far to utilize the many advantages of aluminum alloy 61S-T6 in railway passenger-car construction.




**A series of 4-in. 61S-T6 I-beams after single-blow impact tests on a span of 30 in. extreme deformations under the striking block are free from fractures**

# Maintenance of Budd CF Disc Brakes*

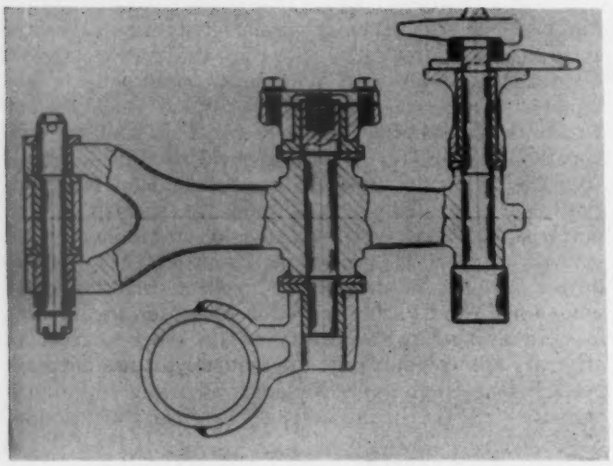


Fig. 1—Section of the brake assembly

BEFORE covering the step-by-step methods of maintaining disc brakes, it is advisable to review briefly the mechanics of this brake. Fig. 1, a section of the brake assembly, shows the pin that mounts the brake cylinder to the tong, or shoe actuating lever, at the left. The diameter of the cylinder is selected according to the approximate wheel load at each truck, thereby governing the amount of braking produced. The tongs to which it is mounted have a fixed mechanical ratio and they in turn are supported by the brake frame at the fulcrum or pivot pin shown at the center, and the shoe pin at the right supports the brake heads and brake shoes. All moving parts are held under spring compression, minimizing wear due to vibration which results in increased life and reduction of maintenance.

To change the wheels, the pedestal tie straps are removed. Two support cables which are kept at the wheel pit for this operation are applied, one end fastened to the lug on the truck frame, and the other to the side arm of the brake frame. The wheels are lowered in a conventional manner, leaving the brake assembly supported by the cables in a position to receive the new pair of wheels.

The open mouth side arm of the brake frame encircles the rear enclosure of the journal box which has been provided with mating wear plates, thus supporting two of the three points of mounting, a third point being the hanger box which is bolted or welded to the cross transom of the truck frame.

As the new wheels are brought up the side arms engage the rear enclosure of the box and raise the brake assembly into position. The support cables are then removed.

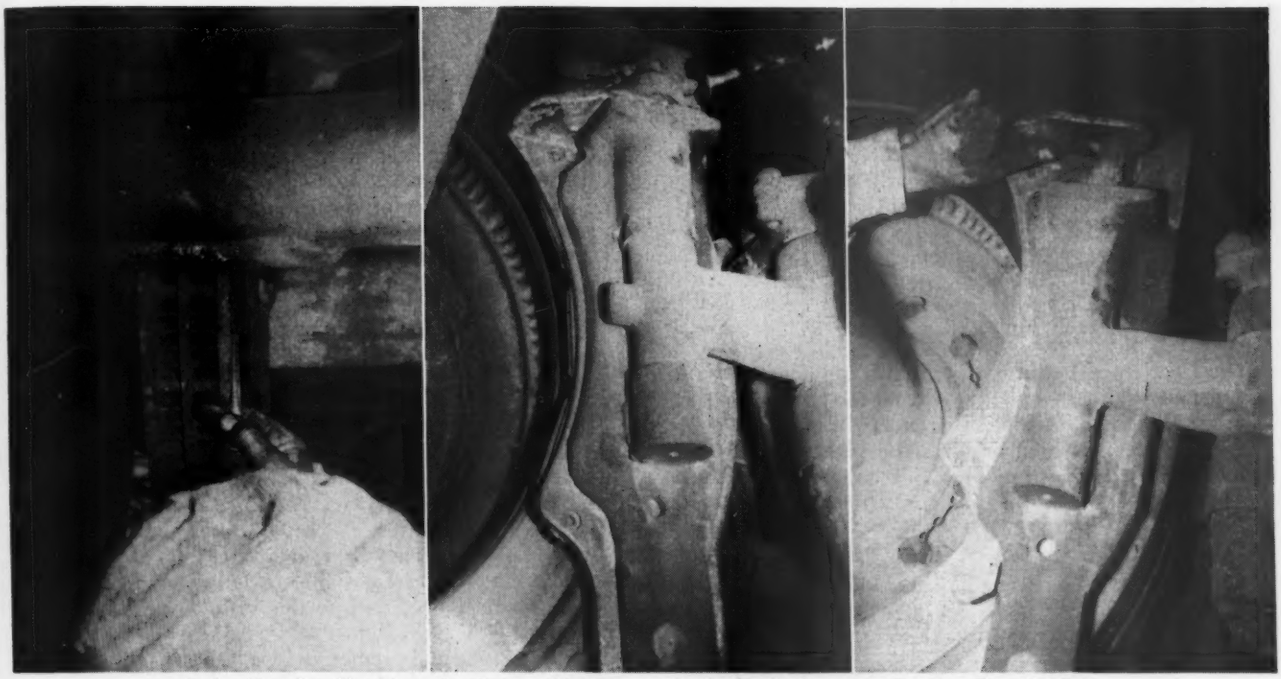
Fig. 2 shows a close-up of the journal box engaging the side arm as the wheel and axle assembly is being raised into position. Due to the absence of slack adjusters the need for running out and taking up the slack has been eliminated not only during this operation, but at all times. This is possible due to the mechanical lever arrangement, and the piston travel being capable of wearing both brake shoes to their condemning limit. Re-application of the pedestal tie straps completes this wheel change operation.

The need for changing brake shoes is governed by the condemning limit or minimum lining thickness of ¼ in. A feeler gauge has been developed for inspectors' use which eliminates guess work and permits the attainment of maximum mileage from each lining assembly. This gauge is a "GO–NO GO" principle and is inserted between the disc and brake shoe next to the lining segment while the brakes are applied. This is important as each 1/32 in. lining thickness is equivalent to approximately 4,000 miles of service.

Fig. 4 shows the brake shoe in place and the wedge-shaped key being removed with a hammer. This relieves

Fig. 2—How the journal box engages the side arm as the wheel and axle assembly is raised into position

* Abstract of a report presented before the Air Brake Association by H. I. Tramblie, air brake engineer, Chicago, Burlington & Quincy.



**Left: Fig. 3—Checking the lining thickness with the feeler gauge—Center: Fig. 4—Removing the wedge-shaped key with a hammer—Right: Fig. 5—Removing the brake shoes**

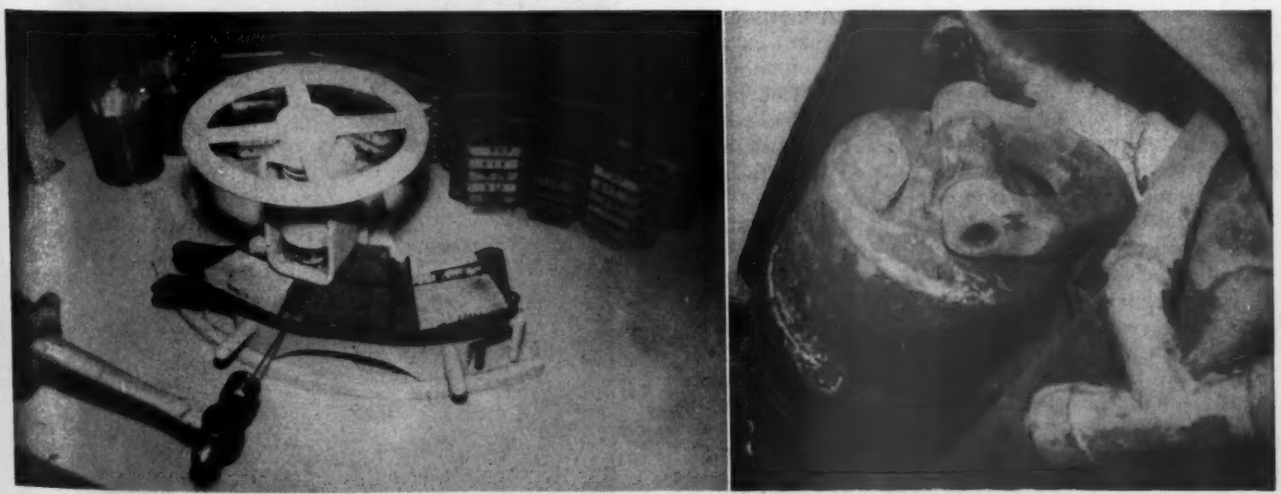
the spring tension which locks the key in place and allows the shoe to be raised vertically off the pin. The extension at the lower end of the shoe is a fork which straddles a pin in the brake head, thereby forming a locator.

Brake shoes on either side of the disc are removed in a similar manner and the application is a reverse order of this procedure, care being taken that the key is driven home to obtain the locking feature created by the spring pressure forcing the retainer into the recess or notch in the key. All of these preceding shoe change activities were performed with the car over a service or inspection pit. Although this is considered more convenient, this work may be done without the necessity of having the car over a pit.

The design of these brake shoes is such that the worn out portion, or the lining assembly, can be replaced on the steel back. This function is a bench job carried on in our air brake shop.

After removing the locking wires with a hammer and chisel, the worn out lining assembly can be lifted off the studs in the brake shoe. Results of extensive brake shoe life records that were kept on each individual car operating in our Twin Cities and California Zephyrs, revealed that brake linings like this one being removed are averaging close to 100,000 miles of service. For example, the California Zephyrs on a six-day cycle between Chicago and Oakland, California, require approximately three sets of shoes per year.

Re-using same brake shoes and study assembly, a new lining is applied over the rubber backing which must be compressed by the hand-operated assembly fixture shown in Fig. 6. The locking wires are inserted individually at



**Left: Fig. 6—Fixture for applying a new lining over the rubber backing—Right: Fig. 7—The brake cylinder is removed as a complete unit and taken to the air brake shop for servicing**

each of the four locations. The ends of the wires are staked over, completing the bench job and the brake shoe is ready for re-application to a car. In this operation care should be taken to select the recommended wire size, this being No. 11 gauge, .120 in. diameter. It is important that the wire be of the proper size to avoid a loose assembly and insure proper compression on the rubber pads. The brake shoe assembly (weighing 12 lb.) is easily handled, making this a one man operation. The assembly fixture shown was obtained from the disc brake manufacturer.

### Yard and Through Terminal Tests

The location of the brake rigging in the truck made it necessary to devise some adequate means of determining whether the brake is applied or not. This was accomplished by incorporating an air actuated on-off indicator coupled with the brake cylinder air supply line. When the brake is applied, the plunger projects beyond the identification plate. This returns to a flush position when brakes are released, and is the means by which the inspector determines an operating brake during a standard yard test.

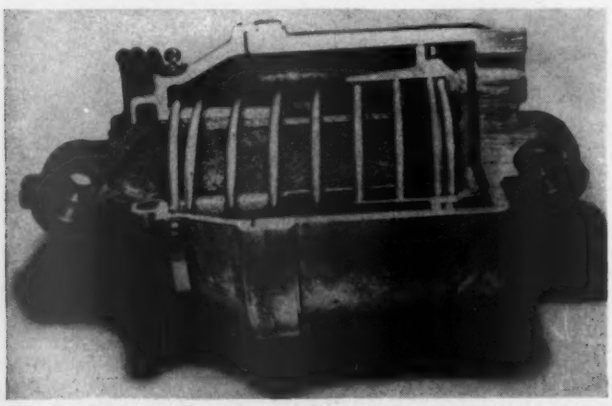


Fig. 8—The packing cup and lubricating swab used with the piston

In addition to this method of inspection, the braking face of the disc is a positive yardstick to determine a working brake. This surface remains bright and shiny, almost as though it were chrome plated, if the brake has been functioning. On the other hand, it takes on a dull grey color or builds a light film of rust on these surfaces if the brake has been inoperative. This method is used extensively at intermediate terminals and by inspectors checking the equipment when it arrives at the coach yard. All braking faces of these discs can be observed from beyond the side of the car.

The brake cylinder is removed from the brake rigging as a complete unit and taken to the air brake shop for cleaning and servicing. This unit weighs 40 lb. and can be readily handled by one man. Fig. 7 illustrates the method of removal. The air fitting has been disconnected from the cylinder, this being accomplished by removing two cap screws, and the mechanic is seen taking out one of the two pins that mount the cylinder to the brake tongs.

Fig. 8 reveals the conventional packing cup and lubricating swab used with the piston, the hollow rod of which slides within the replaceable bronze bushing in the non-pressure head. Also included in the head is the oil-saturated felt ring which lubricates the rod in the conventional manner. This head is attached to the cylinder with three bolts and retains the return spring which has a force of approximately 180 lb. in place. The bellows-type rubber boot expands and contracts with the movement of the piston, making this a sealed unit that does not breathe to the outside atmosphere. The breather feature is a matter of displacing the air from the non-pressure side of the piston into the boot. This air is forced through the larger hair-type filter in the body of the piston each time it is moved as the brakes are applied and released. The bushed holes at each end of this assembly provide press-fitted replaceable wear surfaces for the pins that mount the cylinder to the brake tongs.

### Work in the Air Brake Shop

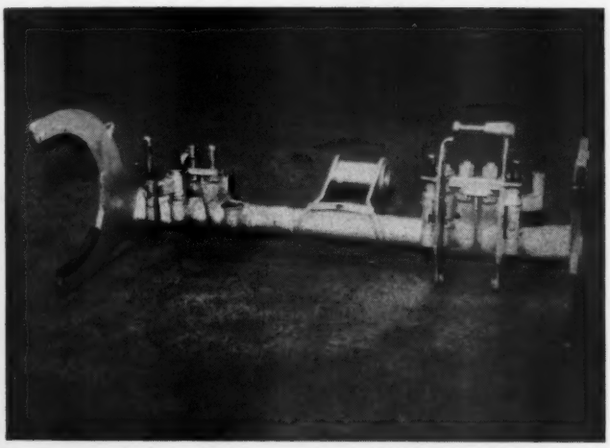
The dismantling for cleaning is accomplished by removing the boot and placing the cylinder in the air-operated fixture shown in Fig. 9. The three bolts that retained the head have been removed, and the spring pressure relieved. This patented fixture was developed by one of our foremen and is adaptable for use with all U-type cylinder head and piston assemblies. The normal cleaning of the individual parts is required and the old lubricant and dirt is removed in a solvent solution bath. The lubricating felts are resaturated with light oil or replaced if worn. If dirt or corrosion exists on the hollow rod it is removed with fine grit cloth as the rod is rotated.

This spindle for this cleaning operation is driven by an air motor, and the polishing cloth is applied with a holder as a safety medium. This fixture is also adapt-

Fig. 9—Air-operated fixture for dismantling the cylinder

Right: Fig. 10—Banding method that secures the rubber boot in place

Below: Fig. 11—Partially dismantled brake



able for use with other air brake parts where cleaning and polishing is required.

Reassembly of the cylinder parts is carried on in reverse order of the procedure outlined for dismantling, again using the air fixture to compress and retain the piston return spring while attaching the cover. A bench air test is made observing an air gauge coupled to the line attached to the cylinder.

This test must hold within 3 lb. for one minute from 60-lb. pressure. The clamp used to fix the rubber boot in place (Fig. 10) is a patented banding method. Although it is necessary to replace this each time the cylinder is torn down, it provides a full circumferential seal and is relatively inexpensive. The particular size used here is 3/8 in. width. Originally, the manufacturer furnishes a band type clamp that is fixed with a bolt and nut principle.

## Re-Application of the Brake

The cylinder is applied to the brake rigging in the truck. The one pin at the far end of Fig. 7 (not visible) is put in place, remounting the cylinder to this one brake tong. Here again the spring loading principle is employed, making it necessary to overcome the spring pressure and extend the piston 1/8 in. to line up the bushed holes for inserting the second pin. This is accomplished by applying a guide point to the threaded end of the second pin (the one in the foreground of Fig. 7), using it as a drift and driving it in place. This spring tension thereafter keeps a constant load on these pins and eliminates the vibration of this assembly. After the air fitting is re-attached to the cylinder with two cap screws, they are secured with a locking wire.

Fig. 11 is a view of a partially dismantled brake, at the right of which the brake shoes have been removed in the manner previously covered. This makes the brake heads accessible, as they also are dropped over the shoe pins and retained by the brake shoe key. These, however, must be removed in pairs because of the engaging guide pin at the upper end of these heads. This hardened guide pin rides in mating bushed holes and to date, after about three years service, it has not been necessary to replace these wear parts. At the left of the brake frame the bridge has been removed. This is held in place by the two large bolts and is the upper fulcrum bearing for the tongs having replaceable press fitted bushings with thrust faces. Here again no need for replacement or excessive wear has been detected. By removing this bridge the brake tongs are exposed for lifting vertically out of the lower fulcrum bearing which also has proven to be an adequate size press-fitted bushing with thrust face.

The bushings at the cylinder end of the tongs are replaceable and here we have experienced need for replacing these due to wear in some cases after two years of service. This has also been true with the relative bushing in the cylinder assembly. In an effort to increase the wear life at this point, and also prevent corrosion and dirt that we found forming on the shoe pin in the brake head bushing area, lubrication tests were conducted jointly with the manufacturer under actual service conditions. The result of this was the adoption of a quick-drying graphite paste and thinner mixture being applied to all bearing surfaces. The advantage found was the prevention of abrasive matter and dirt adhering to this dry lubricant.

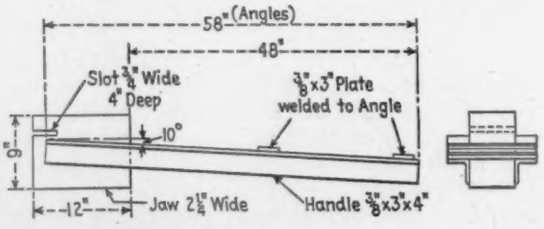
New wheels are pressed on the axle after the discs have been mounted to them. In some cases the used disc is in its fourth or fifth application.

The discs are mounted to the inner face of the wheel hub by 12 cap screws which are secured in pairs with locking wire. We have not found it necessary to replace a disc due to failure under normal operation on this current type of disc brake. It is true some have been damaged and one known cause was being struck by a piece of gear housing from a Diesel locomotive. We presently have these under 88 cars operating over our railroad.

# Tool for Bending Center Sill Flanges

During the winter months, many derailments are experienced on Northern railroads due to less daylight and poor visibility because of rain and snow which are a handicap to terminal inspectors as well as trainmen and switchmen. Many cars are found on repair tracks with repair cards reading, "bent cross bearers, bent body bolster bottom cover plates and bent center sill flanges." This damage is generally due to the cars being thrown off the truck center plate. Damage to center sill flanges is most serious and difficult to repair and one that will show up more if not properly handled.

The attached sketch shows a device used to straighten center sill flanges which has proved satisfactory. By this method, flanges which are bent up can be straightened




**Tool for straightening center sill flanges without heating**

without the use of heat—most steels are readily adapted to cold forming. By the use of this device kinks in the flanges can be smoothed out nicely if the workman will move the bender a few inches at a time. If the damage is great, it may be necessary to go over the same place twice to do a good job. Some excellent repair jobs have been turned out by this method.

The jaws of the bender are made out of a piece of open hearth medium carbon steel with a carbon content of about 0.40 to 0.55. Gear follower plate will do nicely. The slot is cut ¾ in. wide and 4 in. long and handles made from ⅜ in. by 3 in. by 4 in. angle about four feet long are welded to the jaws at an angle of about 10 deg. Plates are welded across the angles to tie them together and a hardwood beveled wedge is used under the jack which is placed at side sill. A 25-ton ten-inch jack is used to furnish power for straightening.

# Truck Side Frames Weakened by Corrosion

According to a circular letter issued by the A.A.R. Mechanical Division under date of May 18, another case has recently been reported of failure of a cast steel truck side frame caused by weakened condition due to excessive corrosion of bottom section. This failure caused the derailment of 23 cars in a train in which the refrigerator car in question was being operated, the estimated damage being about $100,000.

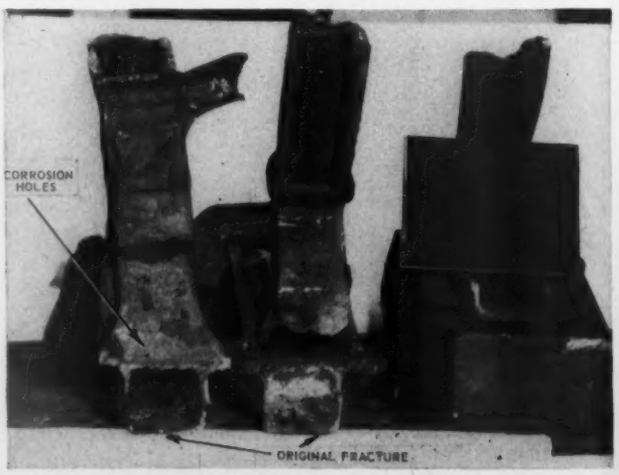
This particular truck side frame was 26 years old and the cross sectional area at the point of failure in the bottom member had been deteriorated by corrosion from the inside to the extent of about 60 per cent of the original area. This weakened the frame and caused it to collapse. The drain holes in the bottom of the side frame were found to be stopped up, and retention of salt brine drippings seems to have caused the excessive corrosion in this case.

A further study is being made by Mechanical Division committees to determine the proper methods to be followed in removing defective truck sides of this nature from service before their weakened condition causes failures to occur. The circular suggests that the following steps be taken to prevent such failures:

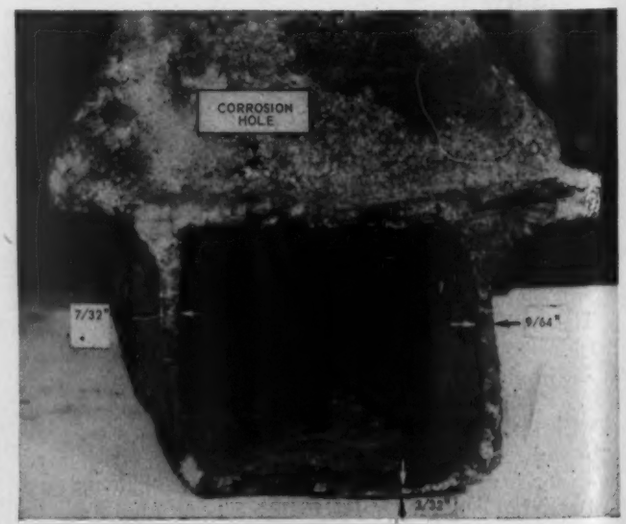
(1) A careful inspection should be made of all truck side frames by all car owners as well as by handling railroads, with special attention being given to frames under refrigerator cars which were cast prior to 1926. Where side frames are found to be badly weakened by excessive corrosion, or otherwise defective, they should be removed from service.

(2) Where drain holes in the bottom section of side frames are found to be stopped up, the holes should be reopened in all cases to prevent retention of brine or moisture, thus minimizing further deterioration from such causes.

(3) Repair records should be carefully studied by all




**Truck side frame which failed due to corrosion holes**




**Close-up view showing corrosion hole and reduced wall thickness**

car owners to determine the frequency of failures of the older designs of truck side frames which are caused by deteriorated condition, and where weaker designs are thus found renewal programs should be set up.

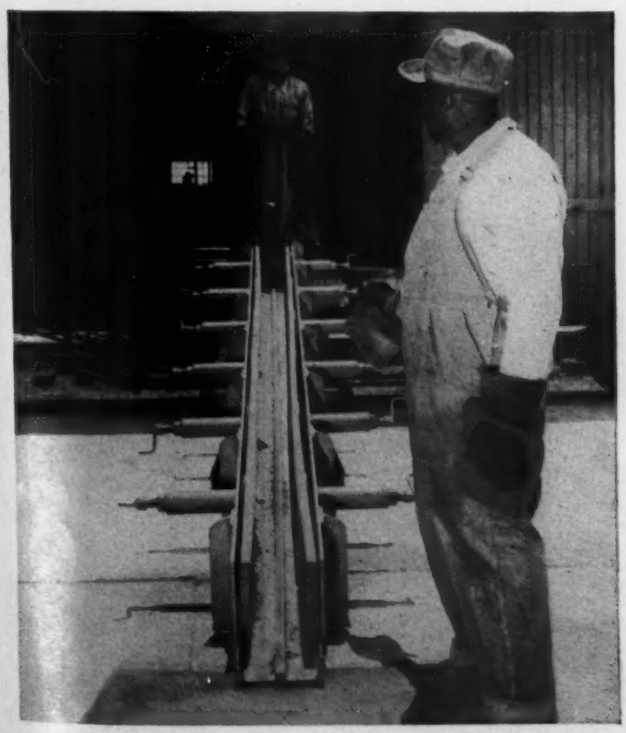
The illustrations show the extent to which truck side frames can be weakened by corrosion, being photographic views of the truck side frame which failed.

## Car Wheel Unloader Chute

A wheel chute used at the Spencer, N. C. shops of the Southern has reduced the time required for unloading wheels in box cars from one car every two days to two cars per day.

The chute is mounted on four steel rollers, 2 in. by 5 in., and is 36 in. high at the car end. With the chute placed next to the car door's opening, the wheels are merely rolled from the car floor into the chute, and they roll by gravity to ground level for further handling. The chute is lined with two pine boards 1¼ in. by 8 in., one on each side, to act as retarders for controlling the speed of the wheel on the descent. The retarding force is varied by six crank-handle jack screws which squeeze the two planks closer together.

The wheel chute has an overall length of about 15 ft. It rests on the ground on the low end and is supported at the high end and approximately in the center on T-iron 4 in. by 3 in. Steps 5 in. by 6 in. with a 1-in. flange are welded to the base at the high end. The steps are used for supporting a workman to free any wheels which might become stuck. The base of the incline is a channel 2½ in. by 9 in. to which is welded for the entire length of the incline a guide rail of stock 1 in. by 1 in. The sides of the incline are of plate ½ in. by 10½ in. welded to the channel.



**Chute for unloading wheels from box cars—The speed of descent is controlled by the crank-operated jack screws which spring the planking inward**

## Scaffold Moved From Working Platform

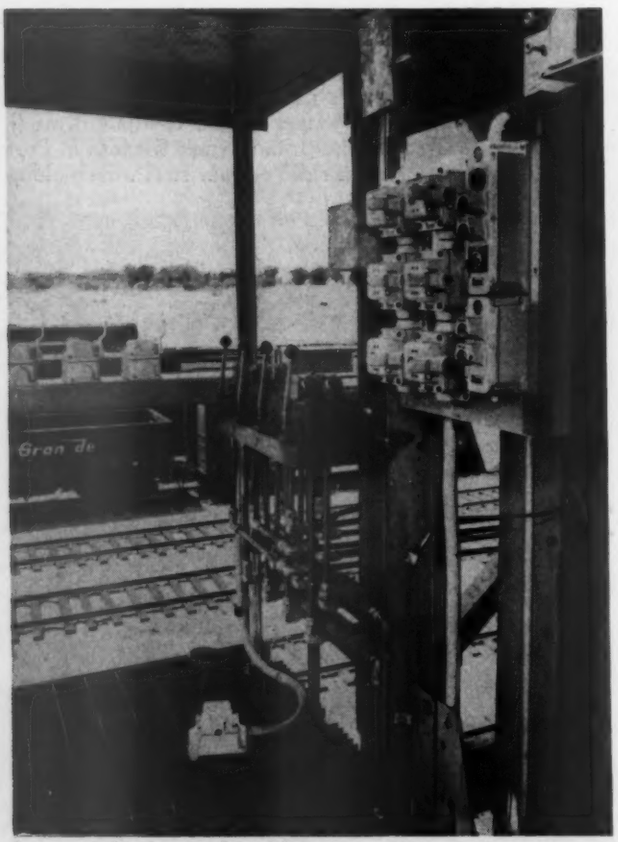
A portable scaffold that is moved by the workman from the working position on either of the two platforms is used on the rip track of the Grand Trunk Western at Port Huron, Mich. The scaffold rides on four steel wheels along a narrow gage track that runs parallel to one rip track. Movement is attained by the workman grasping the side of the freight car and pulling himself along. Work can also be performed on the ends of the cars by placing a board between two of the scaffolds, one on each side of the track.

**Portable scaffold for rip track work which can be moved by the workman from either of its two platforms without descending**

The scaffold is used principally for burning rivets and bolts. Between moves it is secured in position by a brake made from a ⅞-in. rod that drops into the ground. The top end is bent over to hook it in the free position over the top hand rail.

The two platforms, one a little above the car floor level and the other about midway between the floor and the roof level, are made of running board metal. The ladder is made of standard grab iron, and the hand railing is of ⅞-in rod. The main supporting members are angle iron ¼ in. by 2 in. and ½ in. by 4 in. The rod along the outer edge of the truck keeps the hose from fouling.

# ELECTRICAL SECTION



Icing machine control position

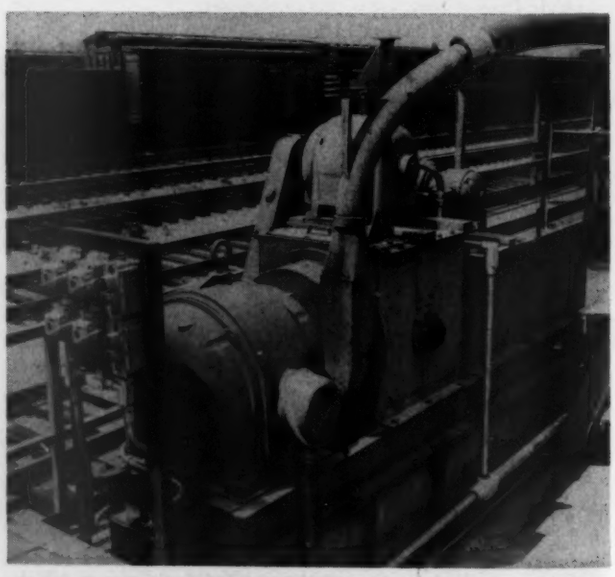
# Robots Ice Two Cars Per Minute

**Denver & Rio Grande Western installs highly mechanized facilities for icing refrigerator cars at Denver, Colo.**

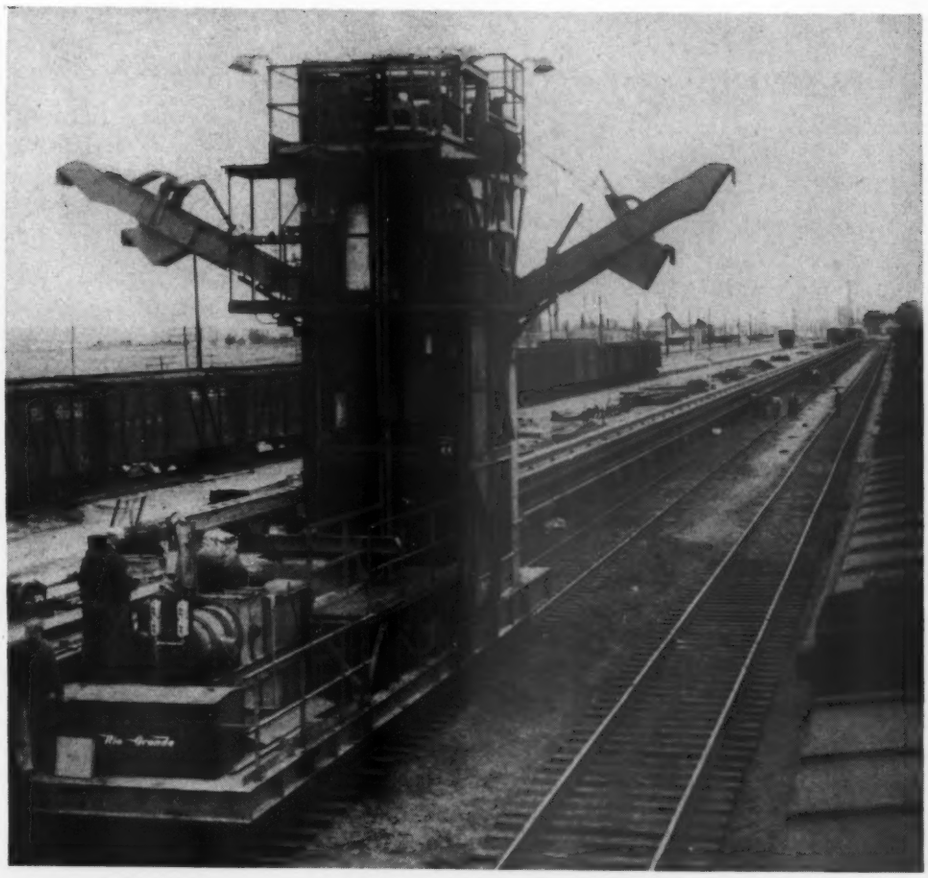
REFRIGERATOR car icing facilities recently placed in service by the Denver & Rio Grande Western at Denver, Colo., include storage facilities, 3,600 ft. of low-level loading platform or ice dock, and two loading machines which break the ice to the size needed for each car and mix in the required amount of salt as the ice goes into the car bunkers. The loading machines are self-propelled and each one is capable of filling the average bunkers in a car in 50 seconds. Allowing 10 seconds to move from one car to the next, it is possible for one of the two machines to ice cars at the rate of one per minute.

Natural ice from nearby mountain lakes is used, and this ice is stored in an icehouse located at the mid-position of the ice dock. Conveyors are reversible and may be used either to load ice into the house or remove it for icing cars. The icehouse which will hold 16,000 tons of ice is 300 ft. long, 100 ft. deep and 40 ft. high. It is divided into three sections and there is a sloping conveyor in the center of each section. There is a daily storage room 12 ft. wide which extends the full length of the icehouse along the front.

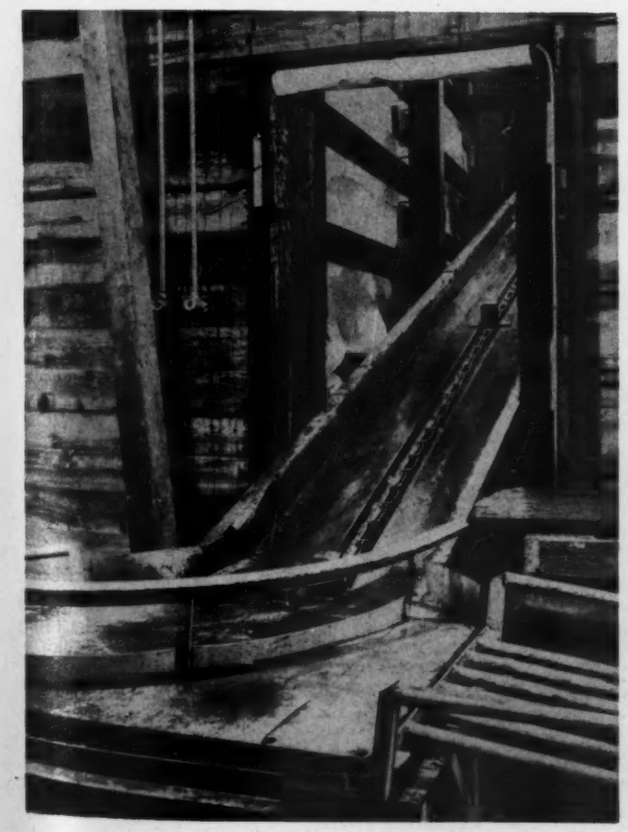
For loading cars, sufficient ice in cakes of about 300 lb. is moved from the house to the daily storage room. Two conveyors move the ice to the center of the storage room



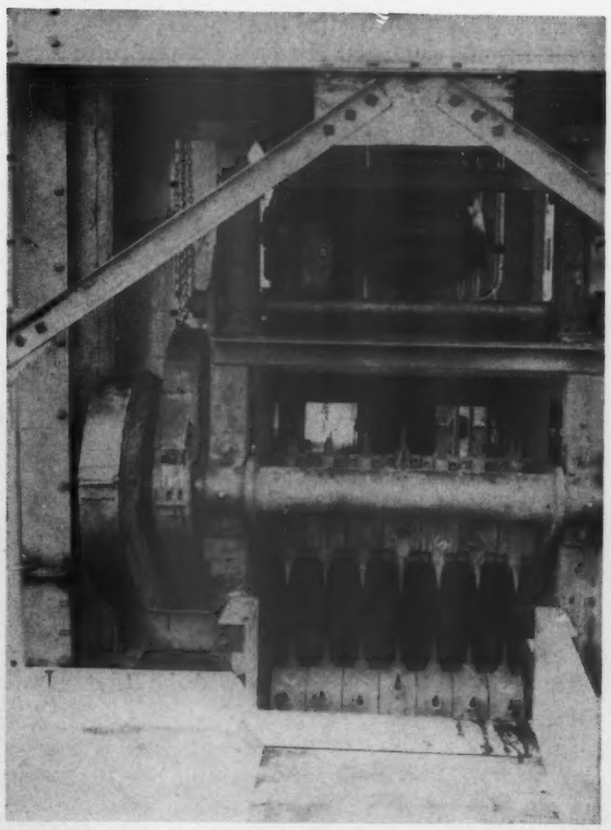
Crusher and blower unit for snow-ice



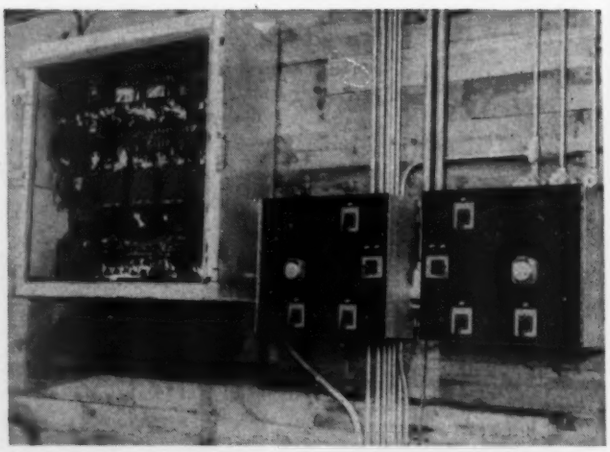
One of the two icing machines—The two spouts deliver crushed ice to both bunker openings of cars on two adjacent tracks—The snow-ice machine is shown on the forward end of the car



Lower end of one of the three sloping conveyors used to move ice in and out of the icehouse



Blocks of ice from lower platform are loaded into intake end of the ice crusher on the icing machine



**Left: Branch circuit control cabinets—Right: Coded control equipment in the daily storage room for controlling conveyors from the icing machine**

where it is deflected from the conveyor and moves by gravity down an incline to one of two pit conveyors which move the ice under a loading track and up to the ice dock. On the ice dock, the cakes are moved northward by one conveyor or southward by another to either of the two icing machines.

The ice dock and one track for the icing machines are located between two tracks on which the cars to be iced are placed. When the cakes moving along the dock reach the icing machine, they are deflected onto the machine. There are two ice crushers on the machine, one which may be adjusted to produce any size of chunk which may be wanted and the other for making very fine snow ice. The cakes may be directed into either crusher.

From the first crusher, the ice is elevated to either one of the two adjustable chutes which deliver the ice to the car bunkers. One of the chutes delivers ice on the track adjacent to the icing machine track, and the other reaches across the ice dock to cars on the track beyond. The position of the chutes may be adjusted to suit the car being loaded and the ice may be directed, by means of baffles and gates, to flow out of either of the two openings in the chute.

A selector at the control position of the ice machine is used to weigh out a batch of salt to suit the car's requirements. This salt then flows into each bunker as the ice is added. A second crusher on the icing machine produces fine snow ice which is blown through a hose to body ice cars when necessary.

## Control and Communication

At the center of the daily storage room are control switches which permit controlling of the house conveyors or of passing the control to the operator of the icing machine. With this control so transferred, the icing machine operator controls the house conveyors, the ice dock conveyor, the motors which move the icing machine along its track, the crusher motors, the elevator motor and the hydraulic machines which regulate the height of the chutes and the baffles and gates controlling the flow of ice to either side of the machine and to either bunker in a car.

To make all the necessary controls possible, two communication systems and a remote control system for motors are required.

Telephone hand sets and loudspeakers are located on the icing machine, in the icehouse, and in the office building at one end of the icehouse for telephone com-

**One of the two Link-Belt drives which move the icing machine along its track**

munication between these points. This is a carrier system using 140 kc. superimposed on the 440-volt power circuits.

The control circuits for operating the conveyors from the icing machine control position are carried through the rails by means of General Railway Signal Co. coded track circuits. The wheels of the icing machine are insulated from the machine, and from each other for this purpose.

A third communicating (P.A.) system permits the workers on the ice dock to talk with the yardmaster. For this purpose, there are talk-back speakers at 300-ft. intervals along the dock.

## Power Supply

Electric power, at 13,000-volts, 3-phase, is delivered to a small transformer station located at one end of the icehouse, where it is stepped down to 440 volts for motors and yard lighting, and to 110 volts for interior lighting.

Branch power circuits from the transformer station are protected by air circuit breakers in steel cabinets, mounted on one end of the sub-station. Each lighting branch is also protected by a thermal De-ion breaker. Floodlights on towers in the yard are controlled by photo-electric relays.

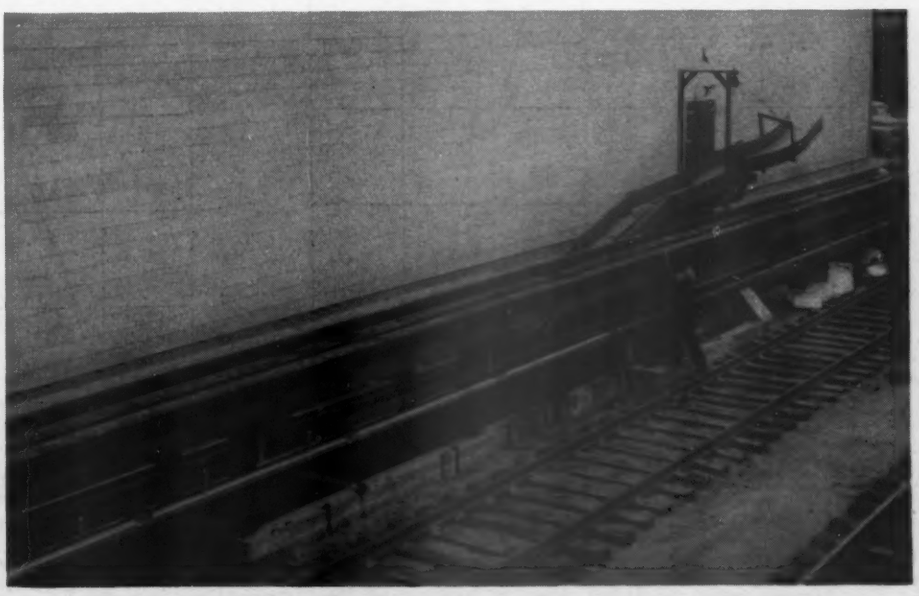
The several conveyors are driven by two 5-hp., five 15-hp., and four 30-hp. motors. A 7½-hp. motor is used to operate a sump pump under the pit conveyors, for pumping out water and slush that accumulates in the pit. Operation of the pump is controlled automatically by the level of the water in the sump.

Power for operating the motors on the icing machine is delivered to the machine by a Feedrail Corporation electrical distribution system with an under-running trolley. This includes three 440-volt conductors in a housing which covers top, sides and a part of the under surface of the conductors. The trolley or shoes operate through a slot in the lower surface of the duct.

The icing machine is a development of the Railways Ice Company, and manufactured by the Link Belt Company. Two 20-hp. motors are used to move the machine along its track. A 10-hp. motor drives the coarse ice crusher, and a 15-hp. motor operates the fine crusher. The fine crusher is adjusted for required size of ice by a 5-hp. motor. There is a 10-hp. motor for the ice elevator. A 25-hp. motor operates the snow ice grinder and a 1-hp. motor drives the feed table to the grinder. A 60-hp. motor drives the blower or impeller which delivers snow ice through a five-inch hose for top icing. A 3-hp. motor moves ice from the dock deflector to the crushers and there are two additional 5-hp. motors, one for the salt elevator, and one for the oil pressure pump. Each of the two icing machines is thus served by motors having a total of 179 hp. In addition, each machine uses 7½ kw. for communication, lighting and coded control.

The installation was engineered by, and installed under the supervision of, G. M. Moore, electrical engineer, and J. J. Schmidt, assistant electrical engineer.

**A section of the Feedrail showing the contact shoe housing and connections**



**A section of the ice dock showing a part of the pit conveyor and chute — All conveyors are reversible**

# Sealed Beam Headlighting

The advantages and successful operation of sealed-beam lamps indicate that the one-eyed locomotive will soon be as dated as the carbon lamp

*By H. H. Helmbright* *

For more than one hundred years, locomotives on the American railroads have been operated at night with one headlight. This situation has prevailed in spite of the fact that other pubic conveyances have long been equipped with two or more front end units for road illumination.

It was not until the automotive sealed beam headlighting system became available that consideration was given to providing something similar for the locomotives. The sealed beam principle obviously possessed numerous advantages which, if they could be worked out practically for locomotive use, would make a great improvement.

Headlight requirements for a locomotive are covered by strict rules laid down by the Interstate Commerce Commission. For instance, each locomotive when operated at night in road service must be equipped with a headlight which will deliver sufficient light to permit a person with normal visual acuity to see in a clear atmosphere, a dark object as large as an average man standing on the track, 800 ft. ahead of the locomotive. The requirements for a locomotive in switching service calls for a corresponding pickup distance of 300 ft., and locomotives which are regularly required to operate in a reverse direction for any appreciable time, must be provided with back-up lights, similar to those used for front-end service.

The present day, so-called, standard headlight combination, for road operation utilizes the 250-watt, P-25 clear bulb, 32-volt lamp in a 14-in. diameter mirrored glass parabolic reflector. The average initial maximum beam candle-power produced is approximately 360,000 (Fig. 1A). For switching service, it is customary to use a 100-watt, 32-volt, A-21 clear bulb lamp in a 12-in. or 14-in.

* Engineering Division, Lamp Department, General Electric Company, Nela Park, Cleveland, Ohio.

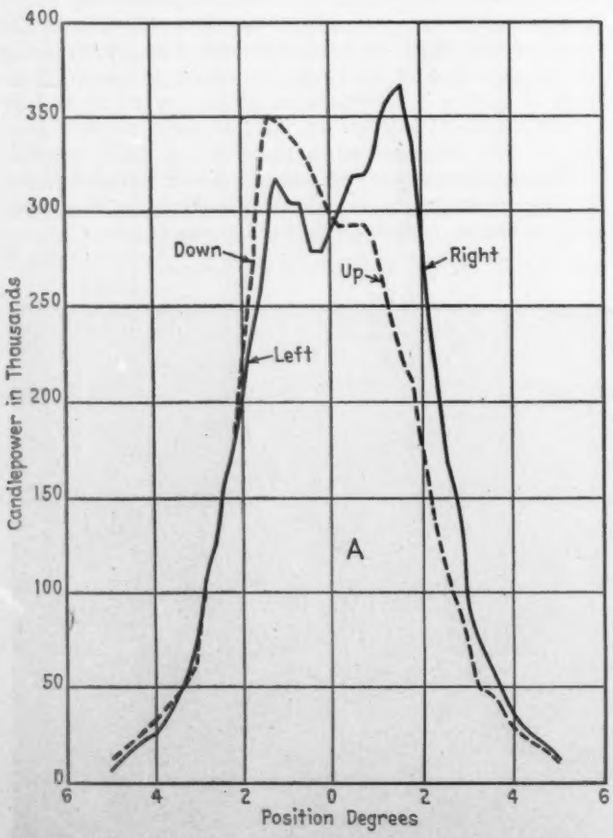



**Fig. 1A—Beam candlepower distribution—Present system, single 250-watt, 32-volt lamp in 14-in. glass reflector**

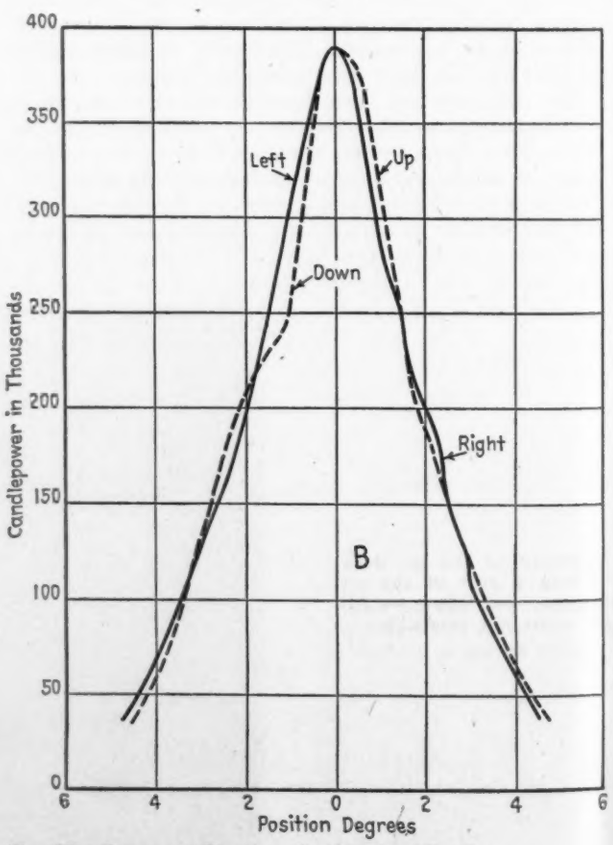



**Fig. 1B—Beam candlepower distribution—Two 200-watt, PAR-56 sealed beam type lamps**

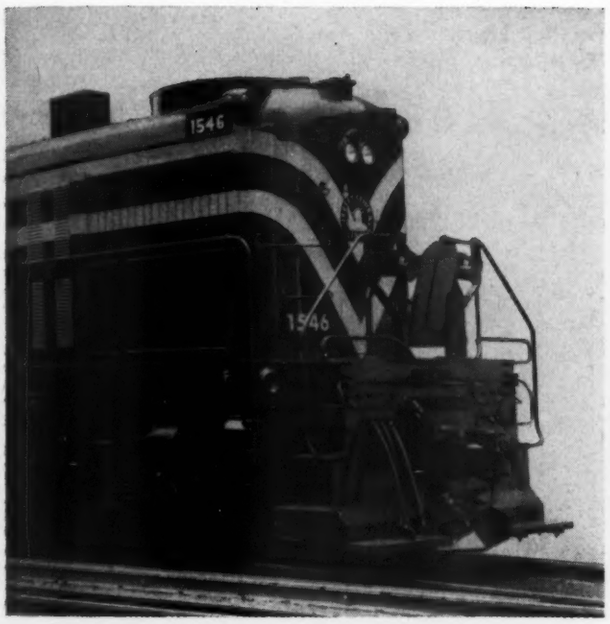



Fig. 3—New sealed beam type mounting arrangement applied to a road switching locomotive

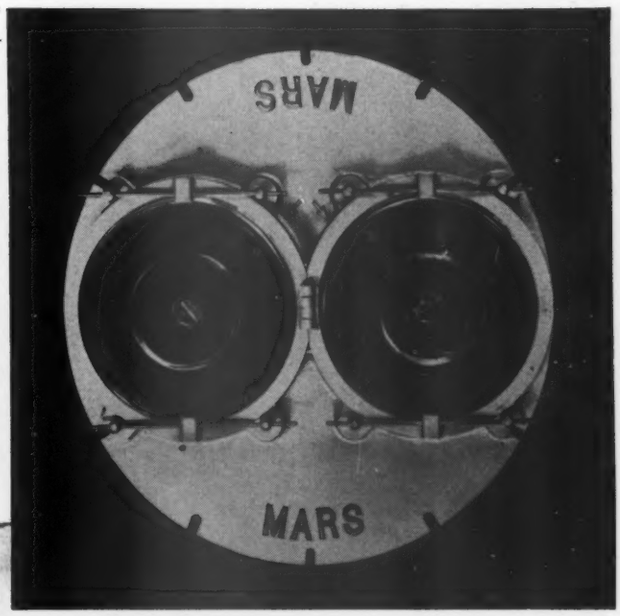



Fig. 2—Typical mounting plate for converting 14-in. headlight case to the sealed beam type system

diameter reflector. Actual tests conducted over a period of years have shown that these lamp and reflector combinations produce adequate candlepower to meet the I.C.C. regulations.

Careful study of the entire problem resulted in an eight-point recommendation listing the features necessary for a fully satisfactory system employing the all-glass sealed beam type headlamps.

1. Sufficient candlepower must be provided to comply with the I.C.C. regulations.
2. The lamps must be adaptable to existing headlight cases.

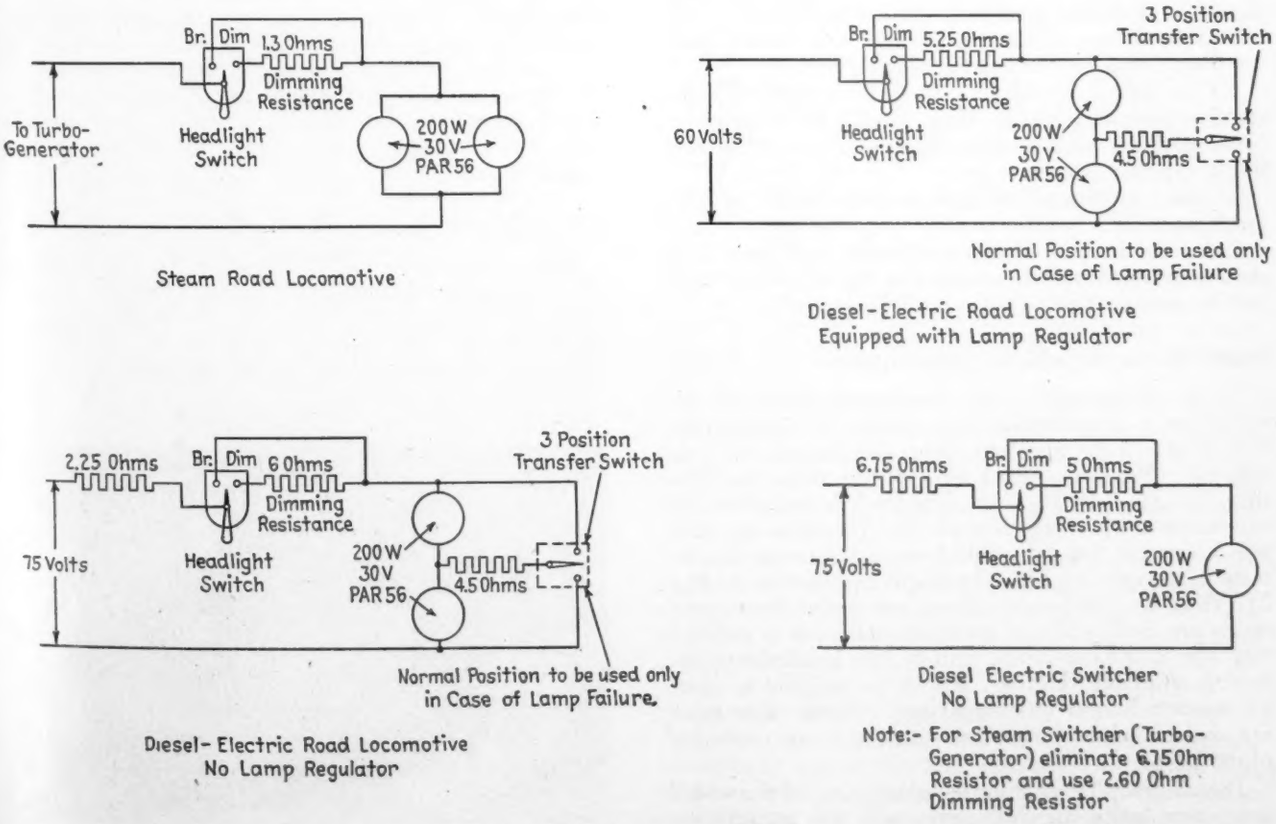
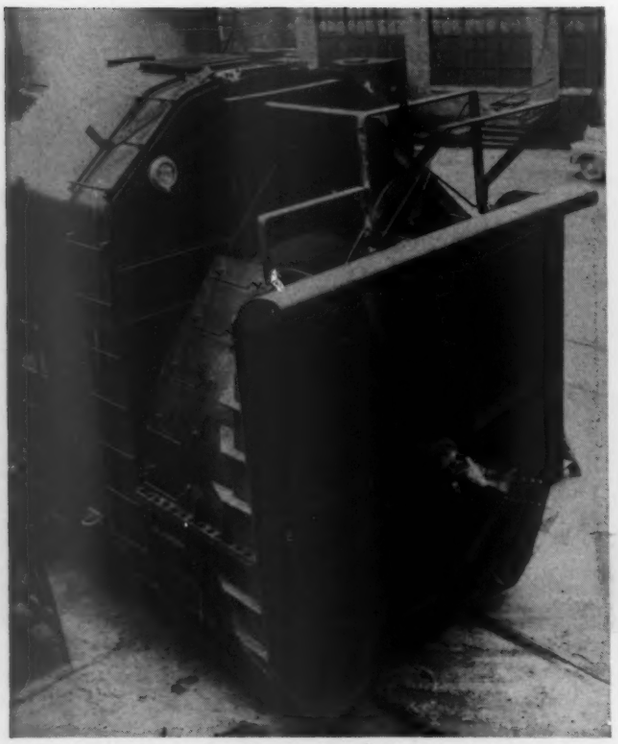



Fig. 4—Wiring schemes for sealed beam type lamps on various types of locomotives—Dimming resistances are calculated so that 17 volts (12 per cent candlepower) will be applied to each headlight when dimmed



Snow plow equipped with the sealed-beam type lamp (Fig. 8)

PAR-56 lamps without guard on business car (Fig. 7)

3. The system must be such that lamp replacements may be made easily and quickly.

4. No aligning of the beam or focusing of the lamp should be necessary when burnouts are replaced.

5. The wattage of the system must not exceed existing power available for headlighting service.

6. The lamps should be sufficiently rugged to withstand service conditions. They should be resistant to breakage from water striking hot lamps, as well as from flying objects.

7. The maintenance of light output should be high throughout life.

8. In the interest of standardization one type lamp should be applicable to steam and Diesel-electric locomotives used in either road or switching service.

## Sealed-Beam Headlight Development

At the beginning of the development work on the sealed beam type headlighting system for locomotives, tests showed that a maximum beam candlepower of about 400,000, (Fig. 1B), could be obtained from two 220-watt, 30-volt, PAR-56 (7-in. diameter) lamps, when the two lamps are properly aligned. The 7-in. diameter bulb was selected so that two could be mounted on an adapter plate in the existing 14-in. headlight case assembly (Fig. 2). Thus, for road locomotives, two sealed beam type lamps are used, while on switchers one lamp is satisfactory. For new locomotives, entirely new headlight equipment is available (Fig. 3). The lamps are held in place by separate hinged retaining rings. Several other types are also available which allow quick and easy changing of the lamps.

The accuracy in molding the glass parts of the sealed beam type lamps, in conjunction with the accurate locating of the filament, eliminates the need of re-aiming and focusing the headlight when burnouts are replaced. Locomotives today are equipped with power supplies adequate for the two 200-watt, PAR-56 lamps being used on road locomotives. The 30-volt rating was selected rather than the 32-volt to insure that the sealed units would be operated at design voltage. This eliminates re-wiring of the headlight circuit on steam locomotives because of the increased load. The 30-volt rating also permits two sealed units to be operated in series on Diesel-electric locomotives which are equipped with 60-volt voltage regulators.

## Diesel Applications

Where the Diesel-electric locomotives are not equipped with voltage regulators a resistance of 2.75 ohms is used in series with the two lamps so that the rated voltage is applied to each of the lamps, (Fig. 4). Where the two lamps are so operated, a substitutional resistance of 4.5

Fig. 5—Views showing rugged construction of PAR-56 headlight lamps


Sealed beam type lamps are adaptable to locomotive warning signals, as well as the headlight (Fig. 6)


Typical steam road locomotive equipped with two 200-watt PAR-56 lamps (Fig. 10)

ohms controlled by a single pole, double throw switch, is included in the circuit. Thus, if one of the lamps burns out, this provision permits the remaining good lamp to operate. In some instances on Diesel-electric locomotives, the two sealed beam type lamps are operated in parallel, each with a suitable resistance to reduce the voltage across the lamp to 30 volts. In this case, it is not necessary to provide the substitutional resistance and switching arrangement.

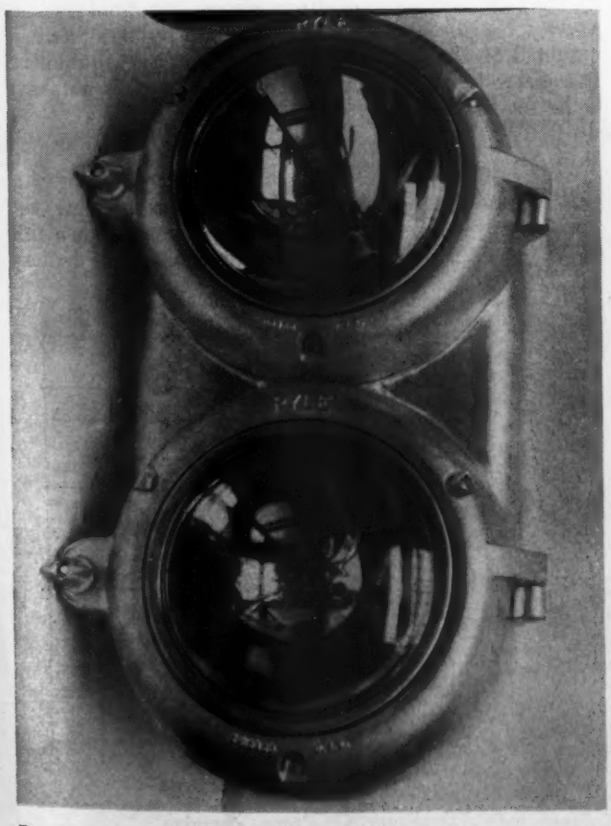


Fig. 9—One type of mounting available for road-switching locomotives

## Performance

The sealed beam type units have shown their ability to withstand practically all types of service conditions which, in the case of the usual lamp and reflector combination, frequently result in goggle breakage, lamp bulb cracks, or in some instances, reflector breakage. The reflector finish is inside the PAR-56 bulb and the coverglass is sealed to the reflector, (Fig. 5). Thus, each time a lamp is replaced, there is a new reflector. This eliminates the need for cleaning or refinishing the reflector which is ever-present with the single lamp and reflector arrangement.

Carefully conducted tests indicate that the sealed beam unit provides a higher light output through life than the conventional lamp and reflector combination. Also, the longer service life reported is due principally to the greater ability of the filament construction to withstand the severe vibration.

For road service, the all-glass sealed beam system provides an emergency headlight feature which does not exist with the single lamp and reflector now in use. The adoption of the all-glass sealed beam type headlighting system also allows the use of one type of lamp for all classes of locomotives which simplifies the problem of maintaining stocks of spare lamps.

In the four years since the initial service tests, this headlighting system has been received with a great deal of interest and acceptance. The advantages and success in operation that have been so convincingly demonstrated suggest that the one-eyed locomotive will presently be as dated as the carbon lamp.

# How to Charge Storage Batteries

The correct use of the constant potential method can effect large savings in railroad application

*By K. A. Vaughan**

THE primary cause of premature storage battery failure is improper charging. It is estimated that industry is currently losing from one-third to one-half its battery capacity due to this factor. And yet battery charging is simple. In fact, it is almost entirely automatic.

Correct charging requires only that d.c. current be passed through the battery to restore the energy which has been taken from it while performing work. This current is passed through the battery at a rate which will not overheat the battery but which will completely charge it within a reasonable length of time, generally eight hours. Current is passed through the discharged battery at a high starting rate and tapers off to a low finishing rate as the battery becomes charged.

### Modified Constant Voltage Charging

One of the most widely used methods of charging industrial truck and mine-haulage batteries is the modified constant voltage method.

This method generally employs a constant-voltage d.c. generator, although a shunt-wound generator can be used when single batteries are to be charged. When the constant voltage generator is used, a ballast register is connected in series with the battery.

At the beginning of the charge, batteries are charged at a high starting rate, the rate depending upon how much the batteries have been discharged. As the battery becomes charged, the charge rate automatically tapers off since the battery voltage rises and approaches that of the generator. Approximately the last 20 per cent of charge is given at a low finish rate—5 amp. per 100 amp.-hr. capacity of the battery. Manufacturers publish recommended finish rates of their batteries, and it is important that these rates not be exceeded. If they are, batteries will overheat and hydrogen will be given off from the electrolyte. When the battery is fully charged, automatic controls disconnect it from the charging circuit.

### Generator Voltage

From the characteristics of the lead-acid battery and by experience, it has been determined that the bus voltage for an eight-hour charge should be 2.63 volts per cell. For example, a 15-cell battery requires a 39.5 generator bus voltage. This voltage is a little greater than that theoretically required, but is used because it furnishes a stable charging current. If a lower voltage were used, the charging current would be subject to considerable variation with slight changes in charging voltage as the voltage of the battery nears that of the generator.

### Generator Ampere Capacity

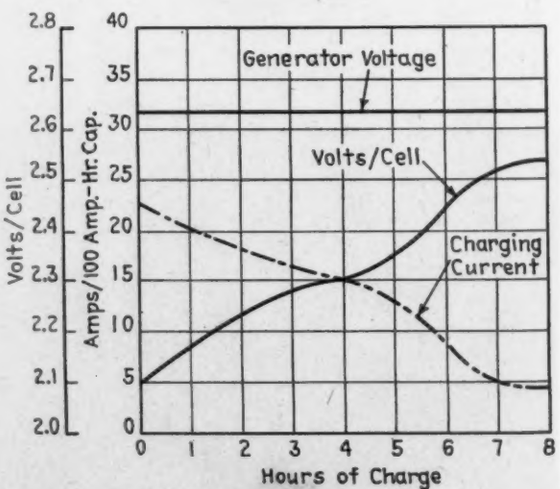
The ampere capacity of the charging generator is determined by the ampere-hour capacity of the battery and the number of batteries to be charged. For each 100 amp.-hr. of battery capacity, the generator should be able to deliver 22.5 amp. Thus, charging equipment to charge a 500-amp.-hr. battery should be able to deliver 112.5 amperes.

### Control of Charge—Ampere-Hour Meter

One method of controlling the charge employs the ampere-hour meter which measures the product of current and time without regard to voltage. In many installations, the meter is mounted on the panel board of the charging equipment, each battery having a separate charging panel. It is set to terminate the charge when the ampere-hours required to bring the battery to full charge have been delivered. To determine the ampere hours required, the specific gravity of a pilot cell is taken before putting the battery on charge, and a chart, supplied by the battery manufacturer, is consulted to give the correct meter setting for that type battery at that specific gravity. Once the meter is set, it is not necessary to reset or take any readings except the final specific gravity reading. Another type of ampere-hour meter is mounted on the body of the battery powered equipment. It registers as the battery discharges and does not have to be set for charging.

### Voltage Relay Timer

A second method of regulating or controlling the charge is by means of a voltage relay timer. When this method is used, a relay operates a timer when the battery




**Graph indicates generator voltage, charging current and volts per cell when charging by the modified constant voltage method**

* Manager, Field Engineering, Gould Storage Battery Corporation.

BATTERY RECORD

Day Operator_____ Night Operator _____ Date_____

| Battery Number | Charging | | | | | | | | | | Put in Service | | | Returned | | | Remarks: |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Started | | | | | Finished | | | | | | | | | | | |
| | Date | Time | Amps | Temp | S.G. | Date | Time | Amps | Temp | S.G. | Date | Time | Truck No. | Date | Time | S.G. | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

**Typical form for recording battery charging data—Forms provide case histories and help pinpoint causes of improper charging**

reaches that state of charge at which the battery starts to gas—2.37 volts per cell at 77 deg. F. The battery is approximately 80 to 85 per cent charged at this point.

The timer, which has been preset, automatically terminates the charge at the end of the time period. The timer setting is generally 2.5 to 3 hours although it will be greater for older batteries. When specific gravity readings taken at the end of the charge indicate the battery is not fully charged, the timer setting should be increased ½ hour.

## Importance of Record Keeping

Of primary importance to correct charging is the keeping of records. Each battery should be numbered, and when brought in for charging, the date, time, vehicle number, battery number, specific gravity of a pilot cell, and temperature of a pilot cell should be recorded. This same information should be recorded when the battery is taken off charge.

Thus, a complete record of the battery characteristics is furnished, which will indicate whether the battery is being correctly charged. For example, if the specific gravity is less than 1.260-1.280 at the termination of the charge, the battery has been undercharged. If the temperature is above 110 deg. F., the charging rate has been too high. If the records indicate that the battery is being over or undercharged, the reason can be determined and corrected before work stoppages occur due to battery failure.

When records indicate over or undercharging, the battery should be checked to see that all cells are functioning; charging equipment should be checked to see that it is correctly adjusted; and the instruments should be checked to see that they indicate correctly.

The battery room foreman should be thoroughly familiar with storage battery technology and should be acquainted with the key points of charging equipment. Some of the larger battery manufacturers periodically


**Batteries being charged by the modified constant voltage method—Batteries in this plant are placed on dollies for safe, easy handling**

conduct courses on the subjects to which battery users are invited to send their battery men. Battery manufacturers also maintain field engineering staffs to help solve battery problems at the users' plants. It is recommended they be consulted when problems arise; early consultations may result in considerable future savings.

## Shipping Containers for Waukesha Ice Engine Units

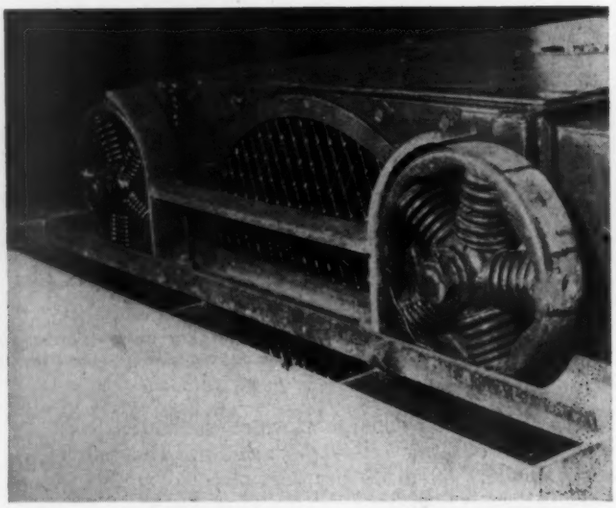
The Illinois Central has change-out points for Waukesha Ice Engine air conditioning units at New Orleans, La., St. Louis, Mo. and Chicago. From these points the units are shipped to Paducah, Ky., where they are overhauled, and reconditioned units are returned to the change-out points.

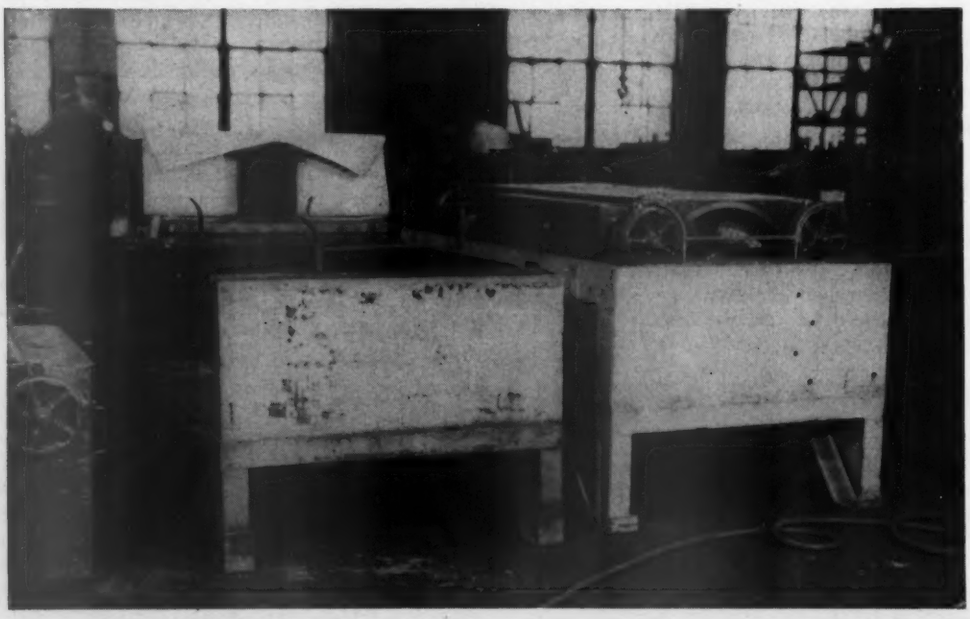
To insure against damage in transit, the shipping box skid shown in the illustrations was developed in the Paducah, Ky. shops. It is of welded construction and is made of ¼-in. steel plate. The unit is cushioned in transit, since it is supported on its four spring wheels on tracks in the same manner that it is supported when in service on a passenger car.

The container has an overall length of 6 ft. 8 in. and is 34½ in. high, and 42 in. wide. The depth of the inside of the box is 18 in. The legs are shaped as shown to avoid tearing of the floor of the car in which it is shipped. The total weight of the container is 1,650 lb.

At each end of the container and flush with the top is a 3-in. x 1 9/16-in. channel, supported by inside ribs 6¾ in. wide, welded to the side and bottom of the box. When a unit is rolled out from under a passenger car, it is rolled onto the two channels in the container. To permit this, one side of the container may be removed and replaced. It is secured by flat plates which fit into sockets.

When the unit is in the container, it is held in a central position by specially shaped members shown in all the illustrations. They are made of 2-in. x ⅜-in. flat iron. The ends curve over the wheels and the members are secured by bolts through holes in the channels.

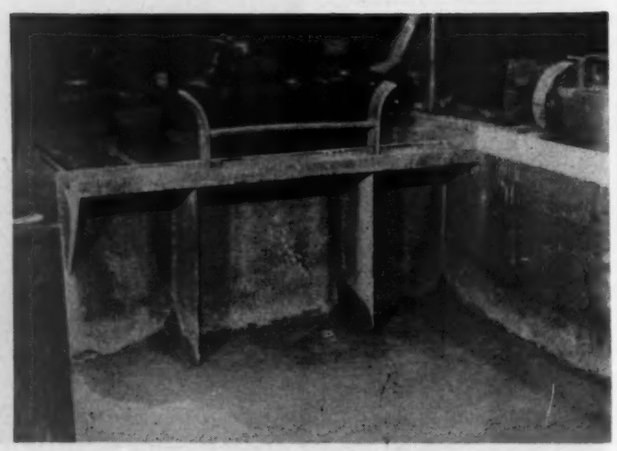




**Above: When the centering device is in place, the unit cannot roll, and the wheels cannot get out of the channel**

**Left: Two ice engine shipping containers — One empty with its side cover removed and the other with an ice engine in place ready for shipment**

**Below: View of the inside of a container showing how the channels are supported and how the centering device is placed after the unit is loaded**



# Alco-G.E. Dual Purpose Diesel

Basic road freight unit with major improvements, adapted to both services, with higher tractive force and top speed of from 65 to 92 r.p.m.

*By John P. Delaney* and Joseph H. Gauss**

THE American Locomotive-General Electric road freight locomotive, of which approximately one million horsepower has been delivered to the nation's railroads since 1945, has been redesigned for dual-purpose application in both freight and passenger service.

Twenty-eight of the new Alco-G.E. 1,600-hp. dual-purpose locomotives will be delivered to the Baltimore & Ohio before the end of the year. Ten of the A units and five of the B units will be equipped with steam generators for passenger service. The freight units will be used in fast freight service between Philadelphia and Chicago. All units have 65 m.p.h. gearing.

Installation of steam generating equipment as a modification and optional motor gearing enables railroads to utilize this 1,600 h.p. dual-purpose road locomotive in mainline passenger service.

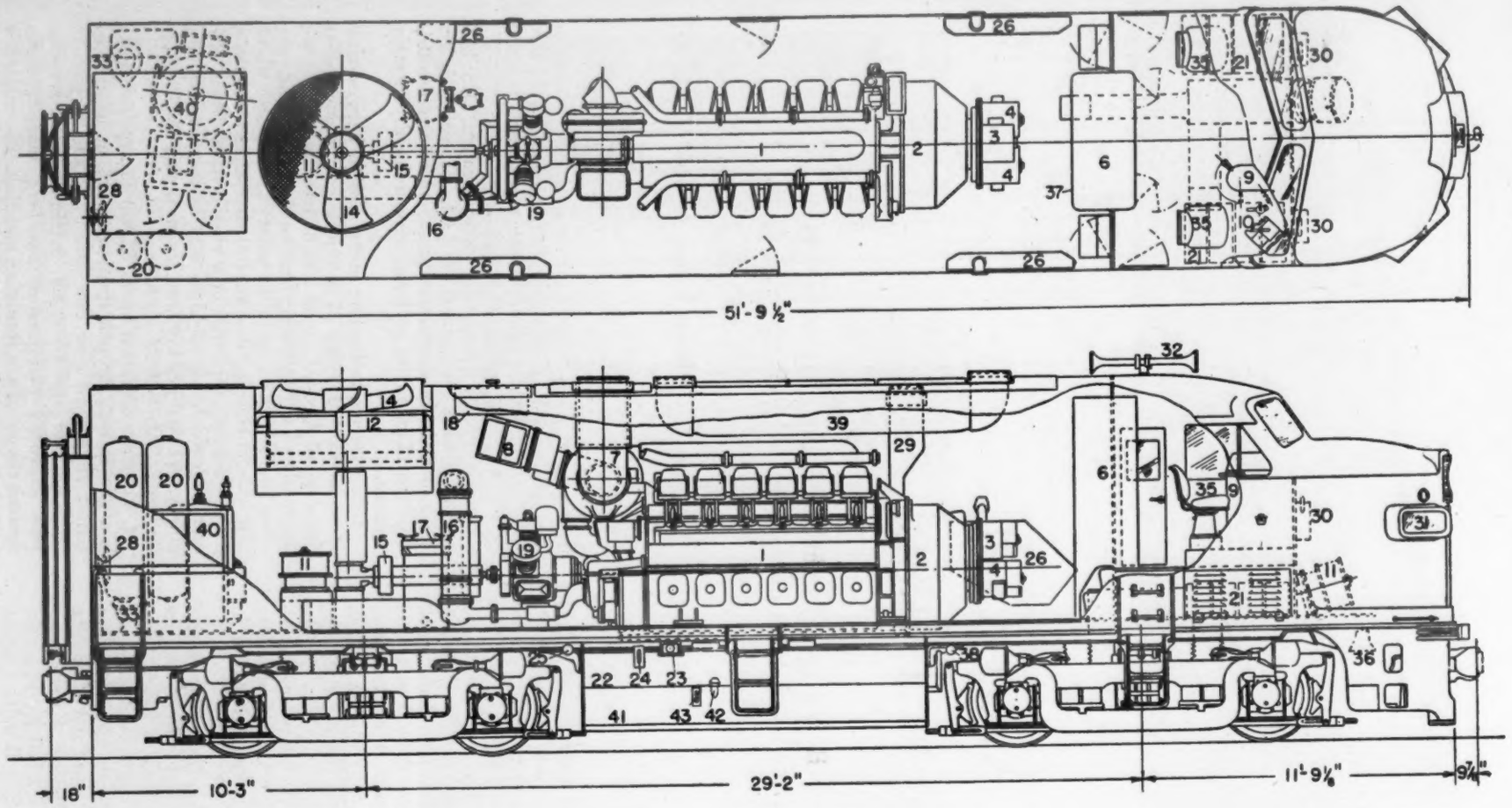
The standard weight of the Alco-GE freight locomotive has been increased to 240,000 lbs. from 230,000 lbs. As a modification, weight can be increased to 250,000 lbs. by addition of ballast. To facilitate application of steam generating equipment the length of units inside knuckles has been increased approximately two feet and equipment rearranged for proper weight distribution. A steam generator with evaporating capacity of 2,750 lb. of steam per hour may be applied to either A or B unit. A steam generator of 4,500 lb. per hour capacity may be installed in the B unit. A 1,200 gallon water tank of welded steel construction, located below the cab underframe, is equipped with remote reading level indicator.

In addition to broadening its application, Alco-G.E. engineers have re-examined the basic locomotive in the light of five years' operating experience with the twin objective of improving performance and simplifying maintenance.

Improvements in traction motor design have resulted in an increase of nearly 25 percent in continuous tractive force on all Alco-G.E. road locomotives. The new motor approaches a self-protecting traction motor, allowing operation in many cases up to the point of locomotive wheel-slip without entering the range of short-time restrictions. This is accomplished with gear combinations which provide high maximum speed as well as increased hauling ability. Optional gearing provides maximum speeds ranging from 65 through 92 m.p.h.

Continuous operation up to 52,500 lbs. tractive force is available with the new traction motor, an increase of almost 25 percent over the former 42,500 lb. tractive force for the same 65 m.p.h. maximum-speed gearing. This improved performance has been made possible through the use of new insulating materials. The engineer's load meter now shows a continuous current of 1,085 amperes, compared with the former maximum of 900 amperes.

* American Locomotive Company and General Electric Company, respectively




1—Engine
2—Main generator
3—Exciter
4—Auxiliary generator
6—Contactor compartment
7—Turbosupercharger
8—Turbosupercharger filters & silencers
9—Control stand
10—Brake valves
11—Traction motor blowers
12—Radiators
13—Radiator shutters
14—Radiator fan
15—Radiator fan clutch
16—Lubricating oil cooler
17—Lubricating oil filter
18—Engine water tank
19—Air compressor
20—Main air reservoirs
21—Batteries
22—Fuel tank
23—Fuel tank filling connection
24—Fuel tank gauge
25—Emergency fuel cut off
26—Sandboxes
28—Hand brake
29—Generator air duct
30—Cab heater
31—Number boxes
32—Horns
33—Toilet
35—Seats
36—Bell
37—Engine control panel

MODIFICATIONS:

39—Dynamic brake grids & blowers
40—Steam generator
41—Water tank
42—Water tank filling connection
43—Water tank gauge

The approved traction motor overhaul period has been increased to 300,000 miles. Traction motor refinements include the use of felt-wick lubrication of axle suspension bearings and a self-closing lubrication door to gear case.

Lubrication periods for traction motor armature bearings have been greatly lengthened. Permanently packed, high temperature lubrication of the traction motor armature bearings, adopted as standard almost two years ago, has proved most successful, and is being continued. This lubrication, operated from overhaul to overhaul without greasing service, has not only reduced maintenance but has also increased armature bearing reliability and life.

Progressive overhaul scheduling has extended the maximum life of traction motor armature bearings through three additional overhaul periods to 1,200,000 miles.

Sealed, long-life lubrication of bearings identical with that applied to traction-motor armature bearings is used on the main generator and all other electrical rotating equipment.

The Alco-G.E. main generator is directly coupled to the engine independent of the locomotive structure. Rated 1,600 h.p. at 1,000 r.p.m., this generator incorporates recent developments in traction generator design. Collection chambers, incorporated in the one-piece adapter which connects the generator frame to the engine, direct exhaust air from the generator out of the engine room. The resulting lower engine room temperature makes possible lower temperatures in the windings, greater loading capacity and longer life of the electrical equipment.

The engine turbosupercharger produces high horsepower per cubic inch of cylinder displacement at an unusually low fuel rate, and in this way locomotive dimensions can be held to a minimum. With the turbosupercharged diesel engine, horsepower output is practically unaffected by altitude up to 10,000 ft.

The engine governor has been redesigned so that the oil reservoir is now an integral part of the governor and is reduced in size. A new window in the reservoir allows for checking the oil level without danger of introducing dirt. The number of moving parts in the governor has been reduced slightly and greater interchangeability of components is provided.

The close coordination of the governor and excitation system for exact control of power output has been maintained. Among the characteristics attained by this system are extremely fast response to engineman's throttle, positive control of current and tractive force, inherent resistance to the tendency of traction motors or the main generator to flash-over and actual anticipation of changes in load. In addition, improved wheel-slip protection is now provided. Power is reapplied gradually, rather than immediately, after a wheel slip, thereby greatly decreasing the tendency of wheel-slip recurrence.

The power of the V-type, 12-cylinder, turbosupercharged Alco Diesel engine has been increased from 1,500 h.p. to 1,600 h.p. This extra power has been made available through the development of more of the engine potential.

The 1,600 h.p. locomotive engine-generator assembly, subject to substitution of a traction motor blower for an auxiliary generator, is interchangeable with the Alco-G.E. 1,600 h.p. road switcher assembly. Engine and generator are installed as a single unit.

Engine lubrication through a full pressure system is provided by a gear-type pump integral with the engine, oil being supplied from the reservoir in the engine base. The filter system is of a new by-pass type, which allows substantially greater flow of oil in cold weather starting, prevents channeling in oil filters, and prevents a plugged oil filter from causing emergency engine shutdown. Lubricating oil is cooled by a single-pass cooler. The low lubricating oil pressure automatically idles or stops the engine.

An electrically driven transfer pump, located in the engine room, supplies fuel from the supply tank to the injection pumps. The supply pipe to the transfer pump is fitted with a duplex waste-packed filter on the suction side and a single filter on the discharge side. In the discharge pipe from the transfer pump are a pressure relief valve and pressure gage.

Engine cooling is accomplished by a gear-driven centrifugal pump, integral with the Diesel engine, which circulates water through the engine, radiators and lubricating oil cooler. A radiator of the panel type is mounted in the roof near the rear end of the engine compartment.

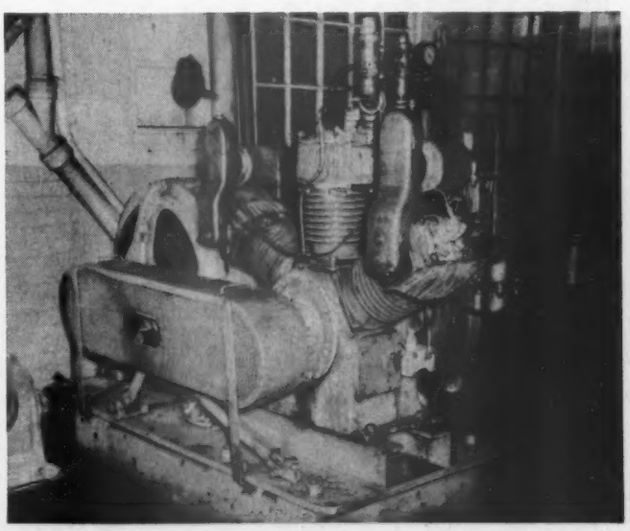
The 72-in. aphonic radiator fan is driven through a right-angle gear box and a magnetic clutch. The clutch is located between the gear box and the Diesel engine drive-shaft coupling. This clutch provides a damper in the drive system against shocks or torsional vibrations and permits superior modulations of fan speed control. Air is drawn through the radiators and exhausted through a screened opening in the roof.

The thermostat-controlled fan speed and the shutters are synchronized and when the shutters are closed the fan does not run. Temperature control for the engine is thus reduced to one variable—the temperature of the jacket water.

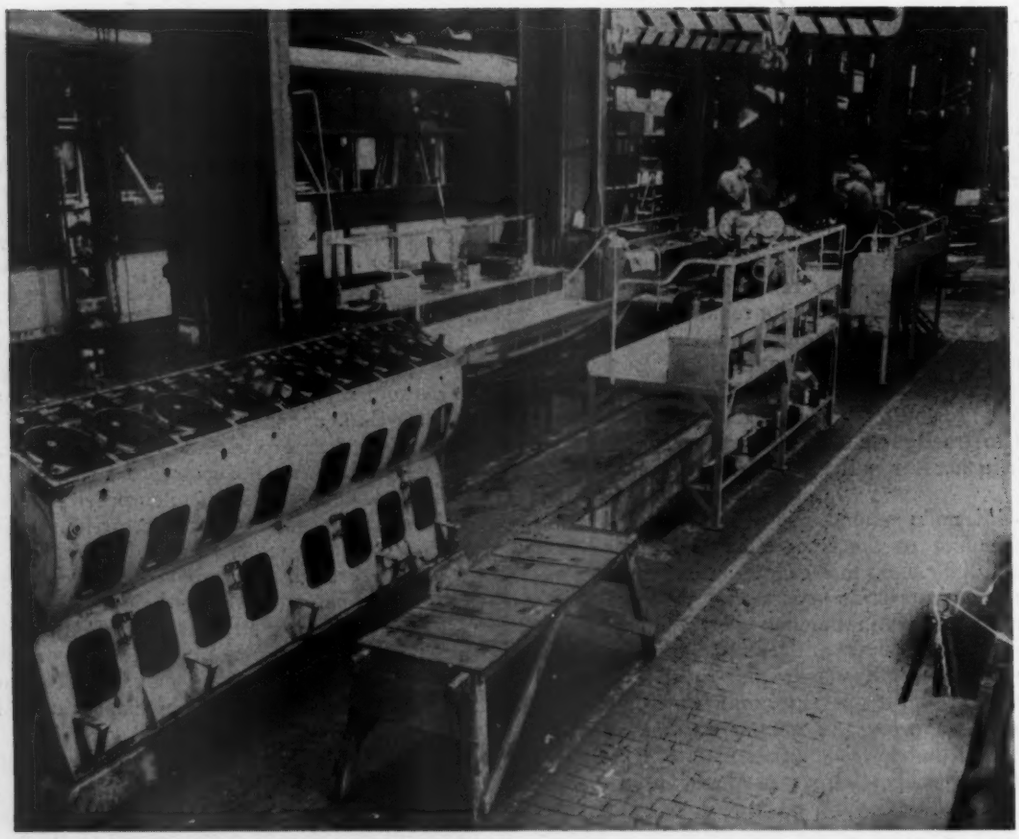
The air brakes are schedule 24-RL, with automatic and independent air brakes on all wheels. Air is supplied by a two-stage, three-cylinder compressor directly driven by the main engine. The displacement at idling speed (350 r.p.m.) is 78.75 c.f.m. and at full engine speed (1,000 r.p.m.) is 225 c.f.m. Two main reservoirs have a total capacity of 35,800 cu. ins.

The trucks on the dual-purpose road locomotive have four wheels and are of the swivel, equalized, swing motion, pedestal type.

* * *



**Compressors are easily mounted on or removed from this rack at Spencer, N. C., on the Southern for testing and breaking in. A 40-hp. motor drives the compressor through a special pulley that fits the free end of the shaft. The discharge air operates the air-brake test rack**



Disassembly station No. 1 is shown in the background and No. 2, with its two pits, in the middle foreground—The engine mounted on the dollies in the foreground is between stations 2 and 3

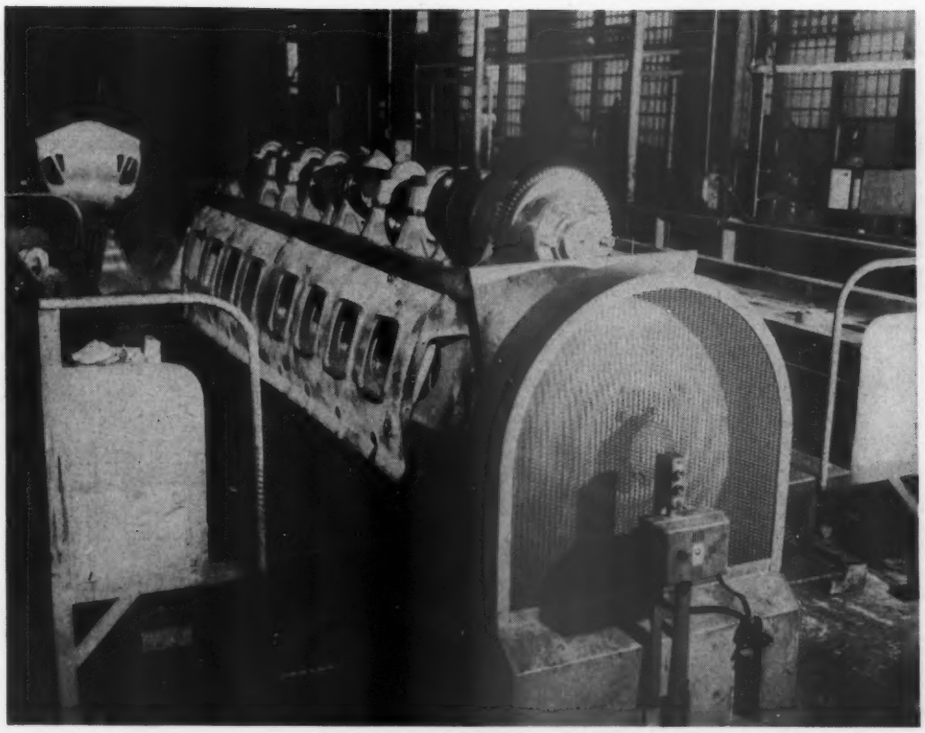
# Assembly Line for Repairing Diesel Engines

THE Southern Railway has set up an assembly line at the Spencer, N. C., shops for repairing Electro-Motive, Alco and Baldwin engines. The assembly area occupies a space 41½ ft. wide by 175 ft. long. When working at a capacity of one engine a day, 14 machinists, one pipe fitter and one painter are employed.

The line has three dis-assembly and six assembly stations, each of which is served by a jib crane with a 10-ft. radius and a 1-ton electric hoist. The engine is delivered to the assembly line with the generator removed but with all other parts in place and not cleaned; the parts are cleaned individually after removal. During the various assembly and dis-assembly operations the engine rides on two dollies on a track with a 40-in. gauge that extends the entire length of both the stripping and the building track. The dollies are 9½ in. high, 23 in. long and ride on four steel wheels.

The engine is dismantled at three major stations. Station 1 has a 15-ft. platform on each side with a working level 37 in. above the floor. The platform is made of ¼-in. non-skid diamond iron. The basic structure is all-welded and made of angle iron and strap iron ¼ in. by 2½ in. These and all succeeding platforms that are permanently mounted are piped for air and electricity The work done at this station includes tearing down both ends, removing gear trains, blowers, oil pumps, water pumps, etc. The cylinder head covers and inspection plates are removed and the cam shaft taken out. All the above parts are then sent to the cleaning vat.

Station 2 has two pits, one on each side of the track, both 32 in. wide, 30 in. deep and 15 ft. long. Platforms similar to those at Station 1 are installed here, but have a working level 46 in. above the floor, to give head clearance in the pit. Parts removed at this station include P-pipes, crab nuts, heads, pistons, and liners, all of which are sent to the cleaning vats immediately after removal.

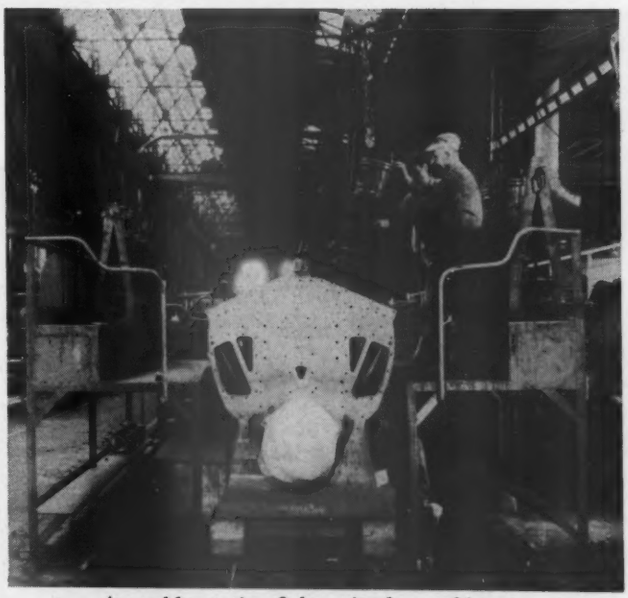


**For the final disassembly operations and the first assembly operation the engine frame is bolted on a stand that can be revolved to any convenient position by an electric motor drive for work on the lower part**

Storage compartments are included at this station and hold head pullers, liner pullers, impact wrenches, bolts and nuts. After the work assigned to station 2 has been completed the engine is moved to an open space between this and the following station where the pan is removed and remaining bolts are loosened. The engine is then moved by the shop overhead traveling crane to the third station.

Station 3 has storage racks to hold sockets and wrenches and platforms 27 in. above the floor. These two platforms are similar to the two preceding pairs except that at Station 3 the platform is portable whereas the other platforms were permanently mounted. The platforms at this location are portable so that they can be placed at a convenient working distance from the engine during stripping and then moved away to give sufficient clearance for turning the engine upside down. The latter operation is performed in a special rack to which the entire engine is bolted. The rack is driven by a 3-hp. motor through a worm and a double-reduction gear, the worm serving as a brake to hold the revolving stand in any position in which it is stopped. After the engine has been turned upside down the crank shaft is removed and set on special racks a little beyond station 3, where it is cleaned by hand. The turning jig has three supports that slide on the top of its main frame to accommodate any type of engine with any number of cylinders.

Parts removed during the preceding three dis-assembly operations are cleaned, inspected and repaired elsewhere at other points in the shop. Individual copper lined baskets are used for groups of some of the parts, for example, one basket holds eight liners, a second 16 wrist pins, a third 16 basket rods, a fourth 16 piston carriers, a fifth 16 connecting rods, a sixth 16 pistons, and a seventh holds eight heads. The above special baskets are made of strap and angle iron $\frac{3}{8}$ in. by $1\frac{1}{2}$ in. covered with $\frac{1}{16}$-in. sheet copper to protect the parts from damage. Parts that are not cleaned in one of the above seven special baskets are cleaned in standard cleaning



**Assembly station 3 has pits for working on the lower part of the engine and racks for holding cylinder liners on the platforms**

baskets. After the A-frame, the crankshaft and other individual parts have been cleaned, inspected and any necessary repairs made, they are sent to the assembly station at which they are to be applied.

## Assembly Operations

Station 1 begins the assembly of the repaired engines and has two positions. The A-frame is brought to this station from the cleaning pit by the overhead crane. After Magnafluxing, the A-frame is painted, and the crankshaft and the camshaft applied. The A-frame is

The platforms at assembly position 4 have metal storage racks on one end of each platform to hold small bolts, nuts, washers, dowels, etc., and a glass-enclosed storage cabinet on one side of one platform for blower gaskets, cylinder head cover gaskets, water pump and oil pump gaskets, and miscellaneous small gaskets.

General view of the assembly stations from the final station showing the storage of parts along the wall of the parts reconditioning room near the station at which they are applied

placed on its side on the cradle for the preceding and following operations:

* Tap and clean out bearing cap stud holes with an air tool.
* Apply studs to main bearings.
Place main bearing shells.
Lift crankshaft and place in main bearing shells in A-frame.
Mount main bearing caps.
Apply nuts to tighten.
Wire all nuts with lockwire.
Use air hose to blow dirt out of oil pipes.
* Install camshaft studs.
Install camshaft lower bearing shells.
Lift camshaft and place in bearing shells.
Install top half of bearing shells.
Install overspeed trip shaft.

Station 2, like assembly Station 1, has two locations and no platforms. The following work is done here:

Place oil pan on dolly.
Install gaskets and the covers over the openings at the ends and sides.
Place A-frame on oil pan.
Bolt oil pan and A-frame together.
* Install straight dowels, drive in place on top.
Rear End:
Apply stub shaft assembly for idler on A-frame.
Bolt assembly in place.
* Insert dowels, bolt dowels and wire all bolts.
Apply blower stub shaft assembly to A-frame bolt in place.
* Ream holes, insert dowels.
Insert pipe plug.
Tighten all bolts and wire.
Front End:
Mount stubshaft on A-frame for governor.
Bolt stubshaft to A-frame.
* Ream holes, insert dowels.
* Bolt dowels and wire all bolts.
Apply drain plugs.
* Set dowels on top.
* Install crab studs in top.
* Drive dowels on top.
* Install and drive dowels at ends.
Clean dirt, thick paint, etc., from inside of A-frame and oil pan.
* Install smaller studs on top.
Mount governor drive gear on hub.
Put on retaining plate.
Bolt and wire in place.
Put on governor drive flange.
Bolt and wire in place.
Apply gasket to accessory drive cover with shellac.
Install drive cover on A-frame.
* Drive in two dowels.
Bolt.
Close ends of piston cooling manifold with flanges.
Bolt flanges in place.
Apply gasket to camshaft drive housing with shellac.
* Insert dowels.
Install crossover pipe on A-frame.
Bolt and wire according to assembly print.
Connect oil line assembly to governor drive hub and crossover pipe.
Wire all bolts.
Apply oil lines to stubshaft and bolt in place.

* Done only when renewing broken studs, dowels, etc.

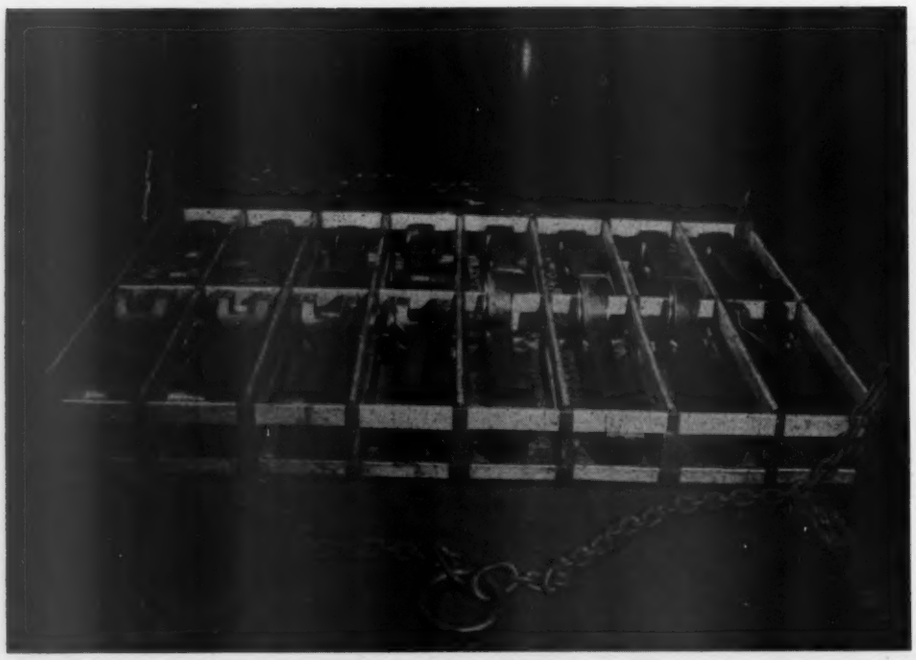
Assembly station 3 has two 15-ft. pits similar to disassembly station 2. The platforms are 46 in. high and have cylinder racks mounted on top, also bins for crab nuts, miscellaneous nuts and washers. The storage cabinets are glass enclosed and hold crab seals, head seals, oil pan gaskets, and miscellaneous small gaskets. At station 3 the following work is done.

Clean A-frame thoroughly to remove paint, etc.
Insert crab stub seals.
Place steel seals into bores.
Install lower cylinder head liners.
Place upper bearing on end of crankshaft which has been placed at bottom dead center.
Insert cylinder liner assemblies into bores.
Screw connecting caps with lower bearings to connecting rod assemblies.
Turn crankshaft and repeat steps working from ends to middle until all liners are placed.
Mount crab nuts and spherical washers on crab nuts.
Tighten in place.
Mount piston cooling tube assemblies on oil manifold lines.
Align piston cooling tubes, bolt and wire.
Place handhole covers on oil pan.
Place handhole covers on air box.
Mount right hand and left hand injector control shafts.
Bolt and wire in place.
Assemble right bank and left bank cylinder head cover frames breather and shield assemblies.
Record serial number of injectors on engine inspection sheet.
Insert injectors into cylinder heads.
Screw in place with crabs and crab nuts.

Assembly Station 4 has platforms 37 in. high and a steel storage rack on one end of each platform for small bolts, nuts, washers and dowels. A glass-enclosed storage cabinet on one platform holds blower gaskets, cylinder head cover gaskets, water pump gaskets, oil pump gaskets, and miscellaneous small gaskets. Work done at this station includes:

Install part of gear housing on end.
Bolt on lube oil relief valve cover.
Install camshaft drive housing on crankcase.
Bolt in place and wire all bolts.
Install pressure relief valve.
Mount two camshaft gears and two counterweights and bolt in place.
Slip two thrust washers on cam hubs.
Slip on two floating bushings.
Mount two idler gears.
Slip on two thrust plates and bolt in place.
Check back lash on gear train.
Align counterweights.
Bolt in place.
Mount oil seal retainer assembly and outer bearing bracket to injector control shaft and bolt in place.
Install gears, camshaft gears and main gear train.
Install side covers on top deck.
Time engine—mount flywheel indicator on lower cover.
* Ream dowel holes.
# Remove camshaft drive gears and counterweights.
# Clean thoroughly.
# Replace gears and counterweights.
# Insert dowels and bolt in place.
Slip thrust washers on stubshaft.
Put on blower drive gears.

# Done only when necessary to install new gears.



Sixteen connecting rods are placed in this manner for cleaning

Eight engine heads can be handled at one time in this carrier

Slip on other thrust washers.
Put on thrust plate.
Lock in place with screws.
Put on hub over dowels in gear.
Mount retaining plate.
Bolt and wire in place.
Mount dowel retainer plate.
Mount and align lower crankshaft cover.
Mike distance between oil retainer and oil slinger with feeler gauge.
Shim oil slinger to 0.100 plus or minus 0.010.
Assemble upper covers to housing.
Bolt in place.
Assemble auxiliary generator drive assembly to upper covers.
Bolt in place.
Check end thrust and run out.
Remove two weights.

Assembly Station 5 has platforms 37 in. high and the same type metal storage compartment as Station 4. A glass enclosed storage cabinet 8½ in. by 30 in. by 67 in. with sliding doors house the auxiliary generator drive gasket, lubricating oil filters, hand hold covers, blower adapter gaskets, and miscellaneous small gaskets and oil filter seals. Work done at Station 5 includes:

Align right hand and left hand blower supports and bolt and wire in place.

Mount water pumps and connecting pipes to accessory housing and bolt in place.

Mount piston cooling and pressure pump assembly.

Assemble lube oil lines to pump and accessory drive cover and bolt in place.

Apply gaskets to back of overspeed trip housing and to vent holes on accessory drive housing with shellac.

Place two vent pipe screws on gaskets.

Mount overspeed trip housing.

Connect two bracket housing supports and bolt and wire in place.

Connect links to left bank and right bank pawl camshaft.

Position two counterweights.

Fit overspeed trip pawl and trip counterweight.

Dowel counterweights.

Position retainers.

Bolt and wire in place.

Apply gasket to overspeed trip cover.

Mount overspeed trip housing and accessory drive cover and bolt in place.

Assemble reset lever.

Mount scavenging oil pump to accessory drive cover.

Bolt scavenging oil pump to accessory drive cover.

Bolt scavenging oil pump in place.

Mount and bolt oil strainer assembly to accessory drive cover.

Mount and bolt blind cover to cover.

Mount breather shields on left and right banks.

Tighten in place.

Clean top deck.

Install rocker arm and valve bridge assembly.

Mount and align right hand and left hand blower assemblies and bolt in place.

Mount governor drive assembly and bolt in place.

Bolt fuel oil supply and drain assembly to manifold drain line and overspeed trip housing.

Mount and align governor and tighten with bolts.

Mount manual control lever assembly and lever assembly (outer end) on assembly line control shaft and bolt in place.

Bolt on blind flange.

Mount oil separator and air cleaner adapter.

Assemble left bank and right bank injector control linkage assemblies.

Connect and adjust clevis.

Check TDC and set pointer.

% Drill and ream hole for No. 2 taper pin through bell crank and pilot valve control shaft.

% Drill and ream two holes for No. 4 taper pins through control shaft levers and injector control shafts.

Assembly Station 6 is the final position in the assembly line and has no platforms. The following work is done at Station 6:

Mount fuel line drain assembly.

Connect fuel line assembly to injectors and fuel line drain manifold assembly.

Assemble and connect all elbows and pipes to scavenging pump and strainer.

Connect oil line assembly.

Assemble supply and drain tube assemblies.

Assemble fuel supply and drain assemblies.

Bolt to housing.

Assemble 4 tube assemblies of supply line pump suction, low pressure and drain lines.

Clean oil pan of foreign material.

Assemble blower and oil separator drain lines.

Connect blower lube oil lines.

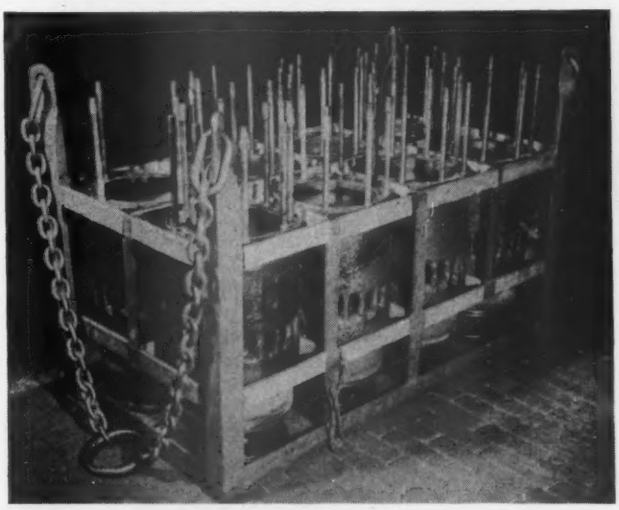
Connect (2) oil separator pipes to blower adapters and auxiliary generator drive housing-cover openings in air cleaner adapters with masking tape.

Water and lube oil test under pressure.

The outside edge of the assembly section is bordered by the Diesel parts repair room. Along the edge of the assembly line formed by the wall of this room are hung gears, gear housings, inspection covers, top deck covers, etc. Each type of part is stored near the station at which it is applied.

% Not done normally.

**Sixteen piston carriers are cleaned at once in this basket**



**This basket is designed to take eight liners**

**Sixteen wrist pins are cleaned at a time in this manner**

## Rack for Holding Templates

Templates around a shop are a necessary time saver and frequently are of such size and shape as to be difficult to store. The question is how to keep them where they can always be found, have them neatly arranged and be able to get the one needed without having to lift and move a lot of the others. The illustration shows how this problem is solved at one large railway shop where 12 of these template racks are in use at various points throughout the shop as required.

The rack consists mainly of a wall bracket, made of ¼-in. by 1½-in. iron, bent to a U-shape with 26-in. base and 6½-in. legs and bolted to a building or machine column. The U-shape bracket is supported in the inverted position and near the bottom of each leg is welded a 12¼-in. length of ½-in. pipe, this length being selected so that the pipe sections, which are accurately alined and welded at one end only, will fail to meet at the center by about ½ in. A small round rod, operated by the pull handle at the left of the bracket extends through the nearer pipe section and into the other section for about one inch so that, when withdrawn, a template may be readily removed through the slot. Templates are normally supported on the pipe sections and cannot slip off the rack with the pull handle and center rod in closed position.

The convenient part of this design is that the template needed can be picked out, slid over next to the center slot which is opened by pulling the handle. It is of course just as simple to re-insert the template when through using it. All templates should be plainly stenciled to show what they are, the blue print number, and the date the blueprint was last revised.

**Special rack designed to hold templates permits easy removal and re-insertion of any one desired**

## Overcoming a Crane Handicap

Shop forces of the Gulf, Mobile & Ohio at Bloomington, Ill., have increased the radius and the lifting capacity of a former jib crane system by converting it to a circle monorail system. The arrangement is used for handling all types of mounted wheel sets on cars and Diesel locomotives. The design was selected because the walls of the building were not strong enough to increase either the radius or the load rating of existing jib cranes, and because the low roof construction made it impractical to install a conventional monorail system. The addition of the circular monorail at the extreme radius of the boom overcame these difficulties and results in all of the load being carried on the floor.

**Circular monorail to increase the radius and loading capacity of jib cranes**

Two cranes were installed, each with a full semicircular monorail on a 22 ft. radius, giving a total span of 44 ft. along one length of the ship. One crane has a 2-ton air hoist while the second has a two-ton chain hoist. All moving parts are roller bearing mounted. The columns are old steam locomotive steam pipes, and the circular support is 80-lb. rail. One boom is a 10-in. I-beam and the second boom is made from two channels ¾ in. by 4 in. by 8 in. riveted together.

## Finishing Diesel Roller Bearing Axles

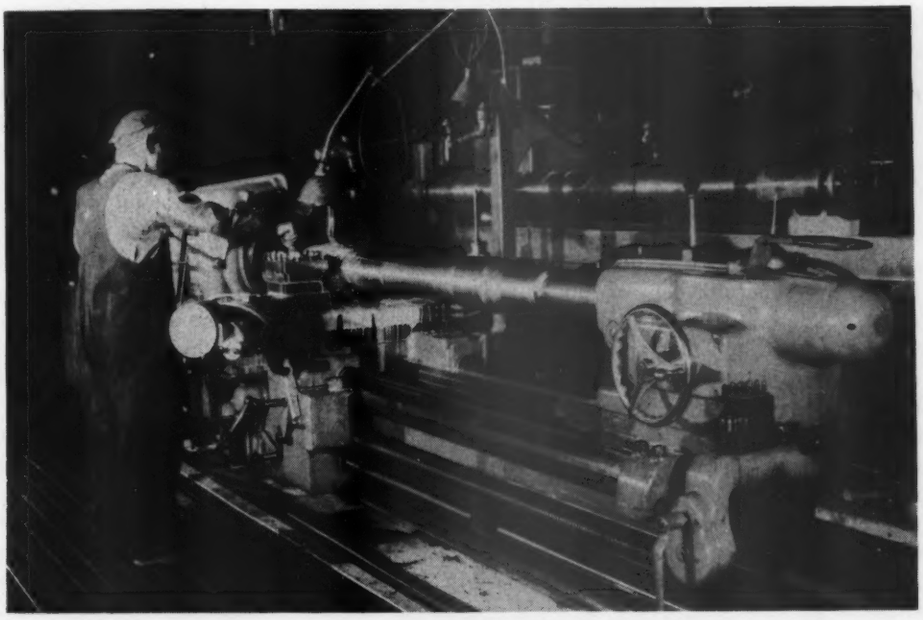
Diesel locomotive roller bearing axles are turned and ground by the Spencer, N. C., shops of the Southern at the rate of three axles per day, using two men, one on an American Pacemaker 30-in. hydraulic duplicating lathe and the second on a Landis 156-in. grinder. Prior to the

installation of the duplicating lathe one man required two days to complete each axle.

Carbide tools are used for both the roughing and finishing cut on the lathe. The speed is 150 r.p.m. for an 8-in. axle and the feed .020 in., except for the finish cut on fillets where the feed is reduced to .006 in. The depth of the roughing cuts averages about ¼ in., the finish cut about .030 in. Two cuts are used to avoid springing the axle and to attain greater accuracy.

On the first mounting of the axle a roughing cut is taken starting at the tail stock end of the lathe and extending to the near end of the near wheel seat. The tool is then moved free to the center of the axle and the section between the axle center and the end of the wheel seat is turned. The same procedure is followed on the finishing cut without moving the axle.

The axle is then turned end for end for the second mounting and the same practice followed for the second half. Diesel locomotive axles are finished all over to within .010 in., which amount of stock is left for grinding. The same arrangement is used on car roller bearing axles, but these are ground only on the wheel seat, the water guard and the inner race seat.

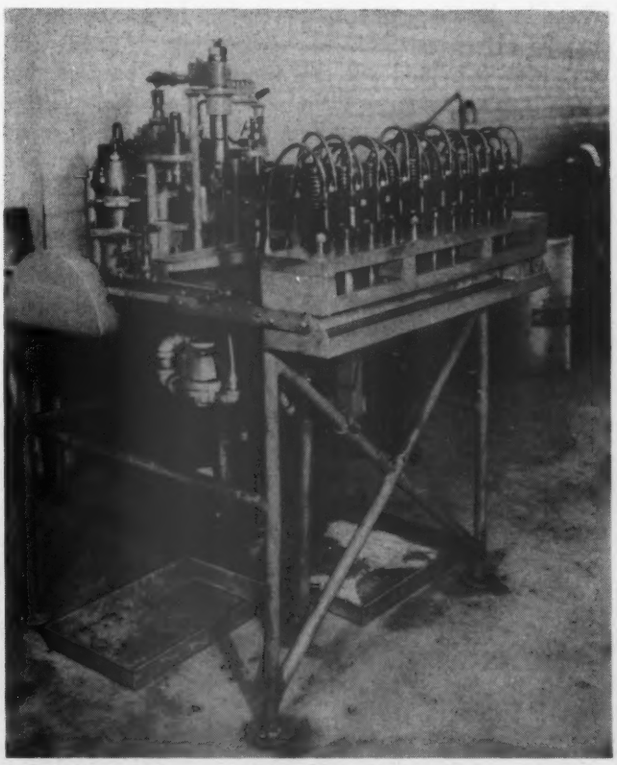


**A combination of duplicating lathe and grinder finishes three Diesel roller bearing axles per day**

## Injector Testing Procedure

The Chicago & North Western has developed a procedure for testing injectors for leaks that has been a contributing factor to reducing lubricating oil changes caused by fuel oil dilution. The procedure and equipment for the test are in use at the road's Kinzie street shops in Chicago. The principle involved is to give the injectors a prolonged test at medium pressure rather than a short test at high pressure, and it has been found that this method of testing finds leaks which would have otherwise gone unnoticed.

The injectors are mounted in a rack of 1¼-in. board which holds ten at a time. They are connected by suitable tubing to a source of fuel oil on which a pressure of 45 to 50 lb. per sq. in. is maintained by the shop air pressure through a reducing valve. After standing for about eight hours at this pressure, the injectors are inspected for leakage of the seal between the body and the nozzle nut. Fuel oil from leaking nozzles is caught by one of two sheet metal trays, one directly underneath the rack and the other behind the rack.



**Arrangement for testing injectors for leakage between the body and the nozzle nut—The test is made at 45- to 50-lb. pressure over an 8-hr. period**

# EDITORIALS

## Tooling the Man As Well as the Shop

An interesting suggestion was contained in a statement recently made before a group of railroad men by a progressive superintendent of motive power. This officer related that, in tooling an entire shop, individual tools were furnished to each and every employee who was required to use tools. One of the benefits of this program was brought out indirectly in a remark made by a general chairman of one of the shop organizations who observed that the life of his shoes had been increased from six weeks to two months.

The interesting point about this indirect result of increasing shoe life is that it is an excellent measuring stick of the value of the program. The decrease in the wear of shoes is an indication of the amount of walking saved, and the walking time saved becomes available for useful work in servicing and maintaining equipment.

This walking time can easily become an appreciable factor when there are more workers than sets of tools. It can lead to delays on the job when two workers need the same tool, and one has to spend useful productive time searching for a second tool that is apt to be anywhere in the shop. Checking each tool in and out of the tool room separately is time-consuming. If entire sets are checked in and out this time can be reduced, but there is always the problem of individual tools getting mixed up within sets, resulting in such things as one set having two monkey wrenches and no pipe wrench while the second set has two pipe wrenches and no monkey wrench.

Tooling the individual has another advantage that should be particularly valuable in Diesel work by making available at all times the proper tool for the job. This will eliminate the tendency of following such practices as using pipe or monkey wrenches on nuts where socket wrenches are called for, or using socket wrenches where torque wrenches are called for. When each man has a complete set of tools for the work he is to perform, the correct tool is sure to be on hand when required. In this way not only is time saved, but additional assurance is gained that the work will be better performed.

## If Sufficiently Robust

Over a period years European engineers have consistently condemned the axle-mounted traction motor for high-speed electric locomotives. It is their contention that this type of mounting is destructive to both the motor and the track. All motors, they say, should be spring-borne with some kind of relatively complex flexible drive between the motor and the driving axle.

Diesel-electric locomotives in passenger service are high-speed electric locomotives. In this country they are used to haul much heavier trains than those used in Europe, and since nearly all American Diesels employ swivel trucks with nose-suspended motors, the European insistence that it is bad practice seems a little strange.

One American engineer explains the differences in practice by calling attention to the relatively high cost of material and correspondingly low cost of labor in European countries. There, he says, they will spend much labor to save a little material, while we, with our higher labor costs, will use a lot of material to save a little labor.

This is entirely logical, but serves only as a partial answer. In a summary of a discussion of the subject which appears in the October 1950 issue of the Bulletin of the International Railway Congress Association appear the following statements:

"If the track is sufficiently robust and well maintained, nose suspension may be used without great disadvantage."

"If the track is weaker, it is desirable to use one of the systems employing resilient transmission and frame-mounted motors if possible."

"It should be noted that nose suspension inevitably causes lateral shocks to the track by reason of the unsprung weight of the motor. The progressive wear of rail and flange only aggravates the trouble."

European engineers now visiting in this country confirm these statements explaining that the relatively lightweight European rail, mounted on chairs, cannot tolerate large lateral thrust. American rail is relatively heavy and the track structure seems to be "sufficiently robust." Actually the heavy track is a fortunate inheritance, insofar as the Diesel is concerned and is something which needs to be looked after carefully. As wheel-loading goes up, and track and locomotive maintenance practices continue, the need for close tolerances cannot be forgotten. Motors with too much lateral tolerance can give a piece of track a beating, and conversely, the effect of rough track will show up very quickly in the motor repair shop.

## Brake-Beam Repairs

The importance of effective brake beam maintenance practices is generally realized and much work has been done in the past to perfect standards and weed out unsafe and otherwise unsatisfactory repair methods. The need for continued effort along this line is indicated by A.A.R. Mechanical Inspection Department reports which show general improvmeent, but continued violation of

A.A.R. standards in some details and at some points.

Conditions are definitely better this year than last when the mechanical inspectors reported finding 60 per cent non-standard brake beams in a representative sampling of completed work at 31 reclamation plants throughout the country having a combined capacity of about 12,000 repaired brake beams a month. Moreover, 1,190 non-standard beams, erroneously marked RSST (removed, straightened, stenciled and tested), were found among material stocks at 68 points on 12 railroads.

Other conditions discovered included nine shops using obsolete brake-beam specifications and eleven without any, either A.A.R. standard or otherwise; two plants where defective beams were not dismantled and inspected as required; three using second-hand and instead of the specified new materials; ten using defective parts and twenty, obsolete or non-standard gauges; seven passing strut keys which were too short or broken in application.

At some shops, incorrect brake head spacing was permitted; struts applied off center; rod ends allowed to extend beyond the nuts; and excessive strut-pin-hole wear passed by use of a round plug gauge of nominal hole diameter. The greatest single irregularity, found at 23 points, related to camber standards. Non-standard gauges were used and sometimes no gauges. In a few cases the compression member was arched in a bending machine prior to assembly thus giving a fictitious final camber and seriously reducing the beam strength and effective service life. Incorrect testing equipment and procedures were also found.

To meet severe service and operating safety requirements, all second-hand brake beams should be repaired in full accordance with standard specifications in the A.A.R. Manual, Section E, which are simple, easily understood and promote economy due to following a definite program of work carefully set up in advance, as compared with erratic practices subject to the changing and frequently mistaken judgment of individual operators. Strict adherence to standard specifications and sound practices in brake-beam repairs means a continued increase in brake-beam reliability. Careless disregard of standard means no improvement and a probable deterioration in brake-beam reliability.

# NEW BOOKS

FREIGHT TRAIN HANDLING INSTRUCTIONS. *Published by The Air Brake Association, 80 East Jackson blvd., Chicago 4. 71 Pages; 4¼ in. by 6 in.; paper bound. Price 50 cents.*

This is the second revision of a book first published in 1914. The first revision made in 1928 was occasioned by the continuing increase in the length and weight of freight trains, while the latest revision results from the advent of the Diesel locomotive and improved air brake equipment on both cars and locomotives. The book is divided into four principal parts. The first part contains general information on damage, how to improve train handling, various things that effect braking, such as time, friction, lading, grade and curvature, and the effect of the various factors combined. Part 2 deals with freight train equipment on cars and on locomotives. The third part is devoted to handling instructions, and the final part to train crew instructions.

STEAM TURBINES AND THEIR CYCLES. *By J. Kenneth Salisbury, Division Engineer, Thermal Power Systems Division, General Electric Company. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. 645 pages, 6 in. by 9¼ in., cloth bound. Price, $9; in Canada, $11.70; College Edition, $7.50.*

This book, for users and manufacturers of steam turbines, designers of power-plant cycles and turbines, and test engineers in power plants, presents the essentials of design of steam turbines in easily understood terms, without unnecessary abstract theory. It presents in four parts the Fundamentals of Turbine Design, The Regenerative Cycle, the New Cycle Evaluation Method, and Application Data. It covers material from basic principles to the most advanced thinking in the field; emphasizes special short-cut methods; and presents extensive practical design methods, design charts, and curves, and test data analysis. Extensive use is made of examples taken from practice, and at the end of each chapter are questions to assist in a more certain understanding of the principles set forth.

RAILROAD INSPECTION MANUAL. *First Edition. Magnaflux and Zyglo. Edited by W. E. Thomas. Published by the Magnaflux Corporation, Chicago 31. 80 pages, illustrated. Bound in heavy paper cover. Handbook size, 6 in. by 9 in. Price, $3.00.*

This manual is intended for the guidance of railroad mechanical officers and those responsible for this inspection on the railroads. It is prepared to furnish specific information on detailed procedures to carry out the most rapid and effective inspection for location of cracks and similar defects, to avoid failure of parts in service. Section 1 covers the fundamentals of the inspection methods as applied to railroad problems. This includes seven chapters on theory of magnetization, methods, equipment, demagnetization, records marking, glossary of terms and operating instructions. Section 2 covers specific details on what to inspect and how to inspect it, with a separate illustrated page for each critical part, specific details on cracks to be expected in each part, and operating details to properly inspect that part. With original issue of the manual the detailed inspection portion includes only the Diesel section completed to date. Remaining sections are now in preparation and will be issued to holders of the manual when complete. They will cover steam locomotives; cars; axles and wheels; track, tools, and maintenance equipment, and welds and castings. Provision is made in binding the manual for loose-leaf addition of the above, or other added or corrected sections in the future, to serve as a continually revised and up-to-date working manual.

# QUESTIONS AND ANSWERS

*The question and answer department is included for the benefit of those who may desire assistance on problems involving matters pertaining to the operation or maintenance of air brakes, Diesel-electric locomotives, steam locomotive boilers or steam locomotive practice. Any inquiry should bear the name and address of the writer, whose identity will not be disclosed unless special permission is given to do so. Anonymous communications will not be considered. Inquiries addressed to this publication will be referred to the source from which authoritative answer can be secured.*

## Diesel-Electric Locomotives

### Traction and Auxiliary Generators

***39-Q.—What is the function of the traction generator?*** A.—To produce direct current for the operation of the traction motors.

***40-Q.—How is the traction generator connected?*** A.—Directly to the Diesel engine crankshaft.

***41-Q.—How does the auxiliary generator function?*** A.—It generates current for battery charging and the low voltage circuits for lighting, control, fuel pump, amplidyne exciter field, train heat boiler, train control, etc.

***42-Q.—How are the auxiliary generators driven?*** A.—Gear driven from the generator shaft on road and road switcher locomotives and belt driven on the road switcher. Some older models have belt-driven auxiliary generators.

***43-Q.—What is the purpose of the amplidyne exciter?*** A.—To furnish excitation for the traction generator.

***44-Q.—How does the blower generator function?*** A.—Furnishes current for the electrically-driven traction motor blower motors on road locomotives.

***45-Q.—Is there a blower generator on the road switcher?*** A.—No. The traction motor blower on the road switcher is belt or gear driven.

### Traction Motors

***46-Q.—How many traction motors are on each unit?*** A.—Four.

***47-Q.—How are the traction motors supported?*** A.—By axle suspension bearings and a spring nest mounted on the truck bolster.

***48-Q.—What is the traction motor connected to?*** A.—The driving wheel axle.

***49-Q.—How is this connection made?*** A.—A pinion is shrunk onto the motor armature shaft which meshes with a drive gear pressed onto the wheel axle.

***50-Q.—What is the gear ratio between the pinion and drive gear?*** A.—It is expressed in two figures, such as 74/18, for the 65 m.p.h. maximum speed combination.

***51-Q.—What do these figures signify?*** A.—The first number indicates the number of teeth on the driven gear and the second number indicates the number of teeth on the pinion.

***52-Q.—What does the gear ratio determine?*** A.—The maximum locomotive speed.

***53-Q.—How are the traction motors connected electrically?*** A.—Either in series-parallel or parallel.

***54-Q.—What does this depend on?*** A.—The speed of the locomotive.

***55-Q.—During acceleration what are the various steps?*** A.—No. 1, series parallel; No. 2, series parallel shunt (reduced field); No. 3, parallel; No. 4, parallel shunt (reduced field).

***56-Q.—When a train is decelerating with the power on, how do the steps take place?*** A.—The steps take place in reverse order.

***57-Q.—What is the definition for transition?*** A.—The changing of traction motor connections.

***58-Q.—What controls transition?*** A.—The movement of what is known as the selector handle, or operation of the automatic transition relays.

***59-Q.—What two methods of transition are used?*** A.—Manual and automatic transition.

***60-Q.—What governs the direction of travel of the locomotive?*** A.—The forward and reverse movements of the locomotive are controlled by the positioning of the reverser in each unit.

***61-Q.—How does changing the reverser reverse the movement of the locomotive?*** A.—Movement of the reverser changes the direction of the current through the traction motor field windings.

***62-Q.—How many traction motors are provided and where are they located?*** A.—Four traction motors are gear connected to each of the four driving axles.

***63-Q.—What is the dynamic brake?*** A.—An arrangement of the traction motors, generator and exciter for retarding the locomotive and train.

***64-Q.—What is this arrangement?*** A.—The motors are reconnected as generators.

***65-Q.—How is a braking effect obtained?*** A.—When using this arrangement, the push of the train against the locomotive causes the traction motors to generate electricity and creates a retarding force. This electricity is dissipated in fan grids mounted over the Diesel engine in the roof of the cab.

***66-Q.—What controls are located at the engineer's posi-***

* This is a new series of questions and answers relating to the Alco-G.E. line of Diesel-electric locomotives. This first group of questions and answers are general in nature; subsequent issues will contain others that deal with locomotive parts in detail.—Editor.

*tion?* A.—Located at the engineer's position are five handles by which the engineer controls the operation of the locomotive. These are the throttle handle, reverse handle, and selector handle which are mounted in the control stand, and the independent and automatic brake valve handles.

***67-Q.—What is the function of the throttle handle?*** A.—To control the engine speed and therefore the locomotive horsepower output.

***68-Q.—How many positions does the throttle handle have?*** A.—Nine positions. Idle and eight running notches.

***69-Q.—How should the throttle handle be operated when advancing from one notch to another?*** A.—The Automotoneer feature requires that the throttle handle first be moved toward the *Off* position slightly, and then advanced to the next notch.

***70-Q.—What is the purpose of this arrangement?*** A.—This mechanical interlock is for the purpose of preventing quick opening of the throttle so as not to have undesirable locomotive performance.

***71-Q.—Is this same arrangement true of the closing movement of the throttle?*** A.—No. The throttle may be closed as rapidly as desired.

***72-Q.—What is the function of the reverse handle?*** A.—This handle controls the direction of locomotive movement.

***73-Q.—What are the positions?*** A.—Three—forward, off and reverse.

***74-Q.—What is the central position?*** A.—When the handle is in the off or central position it is in neutral.

***75-Q.—Will the locomotive move with the handle in this position?*** A.—The locomotive will not move upon opening the throttle as the power circuits will not close.

***76-Q.—When should the reverse handle be positioned?*** A.—Only when the locomotive is at a standstill. The reverser handle will not move from one position to another until the throttle is closed.

***77-Q.—What should be done as a precautionary measure?*** A.—The engineer should remove the reverse handle whenever he leaves the locomotive.

***78-Q.—What is the function of the selector handle?*** A.—It is used for motor transition, and is also used for applying dynamic brakes when a locomotive is so equipped.

***79-Q.—When is the handle in the motoring range?*** A.—When moving the handle to the left from the *Off* position it is in the motoring range.

***80-Q.—When is the handle in the dynamic braking range?*** A.—When it is moved to the right.

***81-Q.—How many power positions has the selector handle?*** A.—Four.

***82-Q.—What is the arrangement in case the locomotive is not equipped with dynamic braking?*** A.—The selector handle is blocked so it cannot be moved into the braking range.

***83-Q.—What prevents free travel of the handle past each power position?*** A.—Two latches are built into the handle to impede its motion.

# Schedule 24RL Air Brakes

SAFETY CONTROL FEATURE (*continued*)

*Operation of the Service Application Portion*

***991-Q.—Describe the operation through the cut-off valve.*** A.—Air enters chamber *C* of the cut-off valve. With the brakes released and no pressure in chamber *D* above the diaphragm, the diaphragm is moved to its upward position by spring *6*. This unseats valve *17* and permits spring *19* to move lower valve *15* to its upper seat position.

***992-Q.—Describe the operation further.*** A.—Air from chamber *C* can then flow to chamber *A* and out passage *3* to pipe *3* and the diaphragm foot valve. Diaphragm *6* in the foot valve being off its seat with the foot pedal *12* released, air flows to pipe *3* and passage *3* in the brake valve to the chamber on top of exhaust valve *351*.

***993-Q.—What controls the action of valve* 351?** A.—The brake valve handle, which seats the valve when depressed, and it is unseated when the handle is released.

***994-Q.—Is exhaust valve* 351 *used with a brake valve having a rigid handle?*** A.—No. With the rigid handle, the safety control system stops at the diaphragm foot valve.

***995-Q.—What happens when the safety control system and chamber* B *on top of service piston* 112 *are charged to main reservoir pressure?*** A.—Spring *129* moves the piston downward to release position.

***996-Q.—Describe the flow of air when a safety control brake application is initiated.*** A.—Air from chamber *B* on top of the application *112* is vented through passage *10*, pipe *10*, chamber *C* in the H-24 relayair valve unit, chamber *A*, passage *3*, pipe *3* to diaphragm foot valve past diaphragm *6*, and choked exhaust to atmosphere with rigid handle, with hinged handle to pipe *3*, to the brake valve passage *3* and past exhaust valve *351* to atmosphere.

***997-Q.—What results from venting air from chamber* B *above piston* 112?** A.—Piston *112* is moved to its upper or APPLICATION position.

***998-Q.—What connection does the slide valve* 114 *make to accomplish a service application when the piston moves it upward?*** A.—The slide valve connects passage *5* from the equalizing reservoir and chamber *D* on the face of equalizing piston *77* to cavity *P* and passages *24* and *18* and pipe *24* to the reduction limiting reservoir.

***999-Q.—What permits the reduction of equalizing reservoir pressure at a service rate?*** A.—Choke *M* in slide valve *114*.

***1000-Q.—What is the result if the brake valve handle is left in Release, Running or First Service Positions?*** A.—All the air in the equalizing reservoir and in passage *5* is vented through passage *18* and past exhaust valve *235* or rotary valve *216* to atmosphere.

***1001-Q.—What happens if the brake valve handle is moved to Lap position?*** A.—Passage *18* is closed by exhaust valve *235* or rotary valve *216*, and the equalizing reservoir pressure equalizes with the second reduction reservoir to provide a full service brake pipe reduction and full service application of the locomotive and train brakes.

***1002-Q.—What functions to cut off supply of air to the***

***brake pipe during the application of brakes?*** A.—The cut-off valve *151*.

***1003-Q.—How is this accomplished?*** A.—The cut-off valve chamber around spring *155* is connected through passage *2a* and port *Z* in slide valve *114* to the exhaust, which permits the higher pressure on the cut-off valve piston to move the cut-off valve to closed position and cut off the flow of air to the brake pipe.

***1004-Q.—Is the locomotive power shut off when a safety control application is initiated?*** A.—Yes.

***1005-Q.—How is this accomplished?*** A.—Port *b* in slide valve *114* connects main reservoir air to passage *25*, pipe *25*, *No. 15-C* double check valve and the power knock-out.

***1006-Q.—What serves to prevent release of the reduction limiting air at this time?*** A.—The reduction limiting reservoir exhaust port *33* to brake valve rotary *216* is disconnected.

# Steam Locomotive Boilers

## Embrittlement in Seams

***Q.—Is it possible to detect embrittlement in the longitudinal seams of a locomotive boiler before it is actually observed as a steam leak?—M. E. D.***

A.—It is possible to determine if the water being fed into the boiler is embrittling and then add chemicals to prevent embrittlement. Several railroads have used an Embrittlement Detector. This device is attached to the locomotive and measures the embrittling action of the boiling water. The water circulates through a block, to which a specimen is clamped and a slow leak creates concentrated solution in contact with the stressed area of the specimen. If the water is embrittling the specimen will crack. When this occurs chemical treatment is added to the feedwater and the test repeated to prove that the water is non-embrittling.

## Vanes in Draft Pipes

***Q.—We have recently purchased some second-hand steam locomotives, and upon examining the smoke stacks we found the petticoat pipe had vertical vanes cast integral with the pipe. What would be the purpose of these vanes? —L. K. H.***

A.—Locomotives equipped with the Cyclone spark arrester have a smoke stack extention equipped with vanes. This type of spark arrester is arranged to create a cyclonic movement of the gases and live sparks which results in the sparks being reduced in size and extinguished.

The vanes are applied in the smoke stack extention to stop the whirling action of the gases and cinders as they enter the smoke stack.

## Tensile Strength of Patch Plates

***Q.—When applying boiler patches to a locomotive boiler, should the plate used in making the patch have the equivalent tensile strength of the shell course to which it is applied?—M. F. R.***

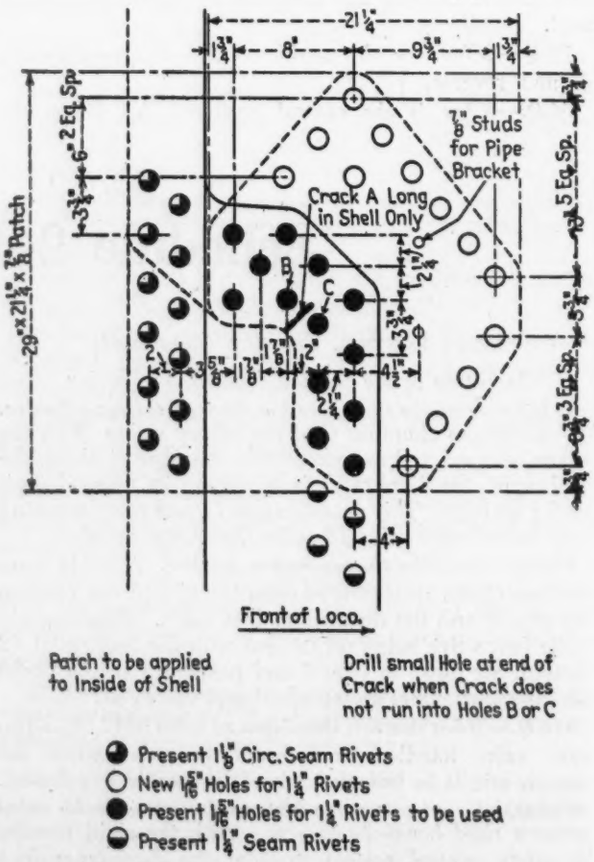
A.—Patch material should be firebox or flange quality steel, never steel of unknown or inferior quality, and should be of the same thickness as the plate to be repaired. The boiler shop should be prepared to produce a copy of the steel maker's test reports for all material used in boiler repair work. If it becomes necessary to provide a plate so that a part of it will not bear a "Steel Maker's Brand" an authorized boiler inspector or steel manufacturer's representative should be called to witness the transfer of the brand before the plate is cut.

In following this procedure it is not necessary for the boiler shop to check the actual tensile strength of the patch plate against the tensile strength of the plate to which it is applied—as the test reports of the patch plate and the original shell plate are available.

## Patch for Throat Sheet Crack

***Q.—Can you give an illustration of a patch to reinforce a crack in the shell course at the knuckle where the throat sheet, sheet course and outside wrapper sheet join?—R. F. P.***

A.—The drawing illustrates a typical patch application to reinforce a crack in the corner of the shell course.

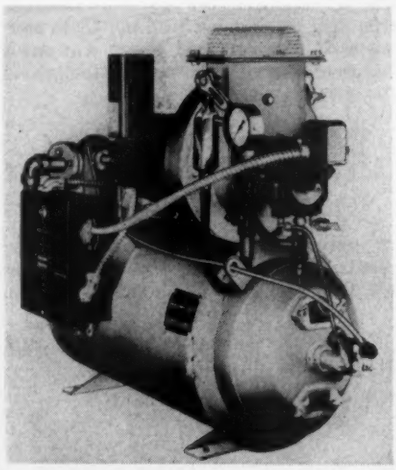



The patch is applied on the inside of the shell using the present rivets in the connection between the throat sheet and the shell course and obtaining the necessary reinforcements for the crack by forming a diamond shape patch adjacent to the throat seam. The efficiency of the diamond shape portion of the patch being equal to that of the longitudinal seam of the shell course.

# NEW DEVICES

## Prevents Diesel Freeze-up During Layover

The Vapor Heating Corporation, Chicago, has developed a compact Diesel-fuel-burning hot water heater for preventing freeze-up of Diesel switching locomotive engines during over-night standby hours and for use as a booster heater on self-propelled Diesel rail cars. The unit is over 80 per cent efficient putting out 150,000 B.t.u. per hour on 1½ gal. of fuel. Current consumption is six amperes at 64 volts for the ⅓-hp. water-circulating motor. The entire unit weighs 225 lb. and fits in a space 33 in. long, 19 in. wide and 26 in.



The Vapor heater

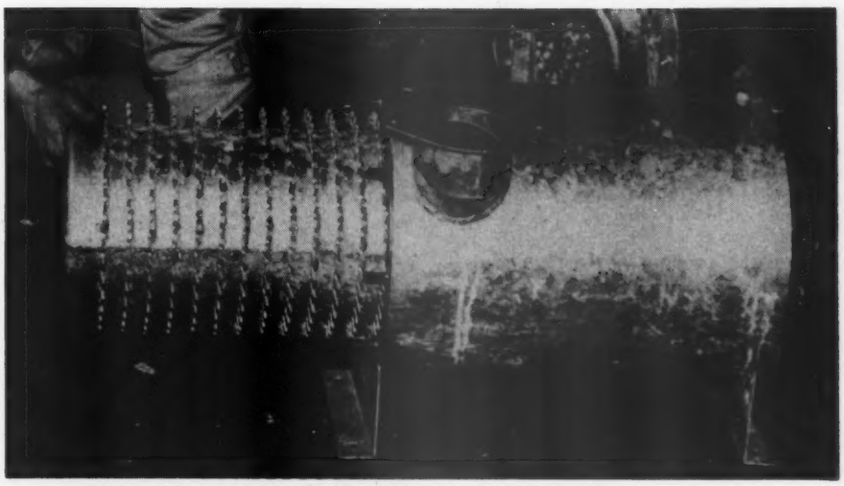
high. The fire pot is made of Inconel to withstand the 2,500-deg. temperature.

When the Diesel switcher is parked for the night the operator flips the heater switch, which turns on the motor that circulates the coolant water and drives the forced draft blower, fuel pump and magneto. The coolant water is continuously circulated during standby hours. When the coolant drops to 100 deg. F., the aquastat in the return leg of the circulating pump calls for heat, and fuel is released. When the coolant water is heated up to 140 deg. the fuel is cut off but circulation continues.

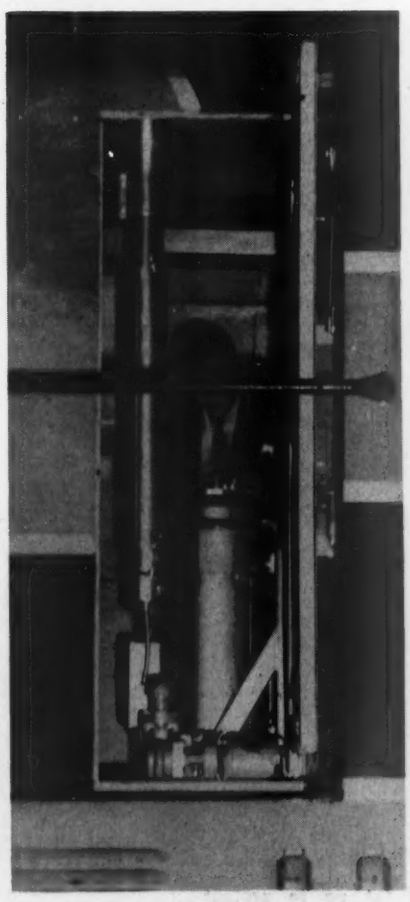
As a booster heater on a self propelled Diesel passenger car, the aquastat control causes the heater to fire up as needed to keep the water in the storage tank, engine blocks and car radiation system at the desired setting, usually on at 160 and off at 180 deg.

Several controls have been developed to insure proper operation and to protect the installation. The water temperature control keeps the water from being heated above 205 deg. If the fire does not light, the unit is shut off in about 45 seconds. An overload cutout protects the motor in the event of bearing failures, obstructions in the water pump, etc. The switcher may be equipped with an alarm bell in case the unit cuts out.

To fit various types of switchers the unit may be installed horizontally or vertically, and the blower and exhaust outlet can be routed to fit the space. On the self-propelled Diesel cars the unit is installed under the car.

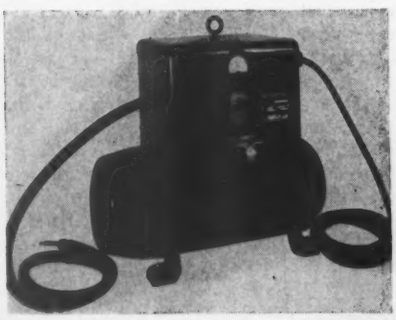


Construction of the water jacket to permit high heat transfer



The Vapor radiator-water heater installed vertically in a switcher

## Charger for Truck Batteries



Motor Generator Corporation, Troy, Ohio, is announcing a single circuit charger Model 669-6-1 for charging a 6-cell lead-acid battery of up to 300 amp.-hr. capacity, such as used in motorized hand lift trucks. It is built as an integral unit, is 100 per cent automatic in operation and is designed to completely charge batteries (lead-acid) in eight hours or less.

To operate this charger, the operator inserts plug connection to battery, and then moves the time clock switch (synchronous motor-driven interval time switch to the "stop" (charge position) which automatically energizes the magnetic coil of the motor starting switch, starting the charge.

An Exide TVR temperature compensated voltage relay operates when the battery is about 80 to 90 per cent recharged. At 77 deg. F. and operating at 2.35 to 2.37 volts per cell, at the battery terminals, this relay

closes applying a.c. to the time clock motor, which clock is set to its present time period,—usually three hours.

At the end of the present time period or when the clock reaches zero hours, it de-energizes the magnetic coil of the across-the-line motor starting switch, shutting down the set, also disconnecting the a.c. from the time clock and opening the battery charging circuit.

## Safety Shield For Welding Work

A newly-designed safety shield, now being introduced by the Mutual Engineering Service Company, Chicago, helps to solve the problem of personnel protection during welding operations in an economical and practical manner. This shield, known by the trade name of Spa-Fla, is made of flame-resistant canvas, and provided with metal reinforcement to make itself supporting. Two layers of canvas are sewn together to form an envelope into which is fitted a piece of galvanized hardware cloth to the full size of the shield. The hardware cloth is made of 17-gauge wire. The shield may be rolled and unrolled many times without damage to the wire or to the canvas.

These Spa-Fla Safety Shields provide convenient means for the welders to protect others particularly on maintenance work. They are made in two standard sizes although special sizes and shapes are available. These are 36 in. by 72 in. and 48 in. by 72 in. The larger size weighs approximately 12 lb.

A particular advantage of these shields is their light weight and the convenience with which they may be carried from job to job and set up. It is necessary only to unroll the Spa-Fla shield and set it on edge to protect everyone in the vicinity of the work. When the job is finished, the shield can be made into a 10-in. roll and easily carried under the arm or attached to the welding equipment for moving to the next job.

Spa-Fla safety shields have been ordered and are being used by a considerable number of individual railroads and industries, although it has been on the market only since January of this year. The Spa-Fla name is registered as a trade mark, and application for a patent has been made on the construction of the shield.

Left: Light and effective Spa-Fla shield set up to protect any welding or cutting operation—Right: How the shield is rolled up and easily moved to another location when necessary

## Knee Type Milling Machine

A line of general purpose knee type milling machines, in plain and universal styles, has been introduced by Kearney & Trecker Corp., Milwaukee 14, Wis. Designated as model CK, the new group of machines is offered in five sizes: No. 2, 3, 4, 5 and 6.

In general appearance and internal construction, these millers have such features as the three-bearing spindle, double overarms, an enlarged compartment for easier access to the cross-mounted motor, and heavily ribbed box-section sponson design of column and knee. Lubrication is principally automatic through a forced flood system in the column and knee and a positive metered, pressure pump system for the table, saddle and knee ways, and the cable-feed assembly.

The principal features include newly designed columns, heavier by 1,000 to 1,200 pounds depending on machine size. Increased horsepower ratings, coupled with independent motor drives for spindle and for feed and rapid traverse, is an added feature. Spindle horsepower ratings of these millers, according to size are as follows: 10 hp. for the No. 2; 15 hp. for the No. 3 and 25 hp. for the Nos. 4, 5 and 6.

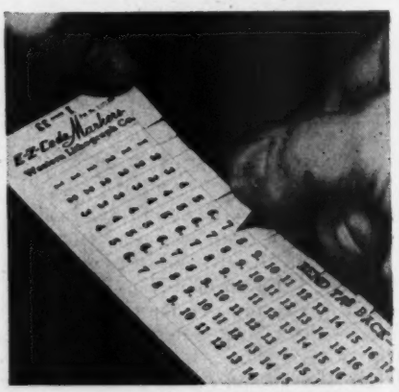
In addition, there is the innovation of a double duty spindle nose on the No. 4, 5 and 6 size machines. With the conventional No. 50 national standard spindle nose, a No. 60 heavy duty driving flange has been integrally forged with it to permit improved cutting efficiency when larger diameter face mills, or flange type arbors for large diameter side and slot cutters are used.

Feeds and speeds to take full advantage of modern cutting tools and feed changes from ⅜ to 90 in. per min. are provided on all machines and 24 spindle speed changes. The speed range on the No. 2 and 3 machine is 15 to 1,500 r.p.m. and 13 to 1,300 on the No. 4, 5 and 6 units.

The universal style machines are equipped with a hypoid type universal spiral dividing head. This head has a quick indexing ratio of 5:1 between spindle and handcrank. Chucks and face plates are mounted direct without special adaptors. Preloaded ball bearings are used in mounting the dividing head spindle to overcome oil film float and assure a constant factor of accuracy during the lifetime of the dividing head.

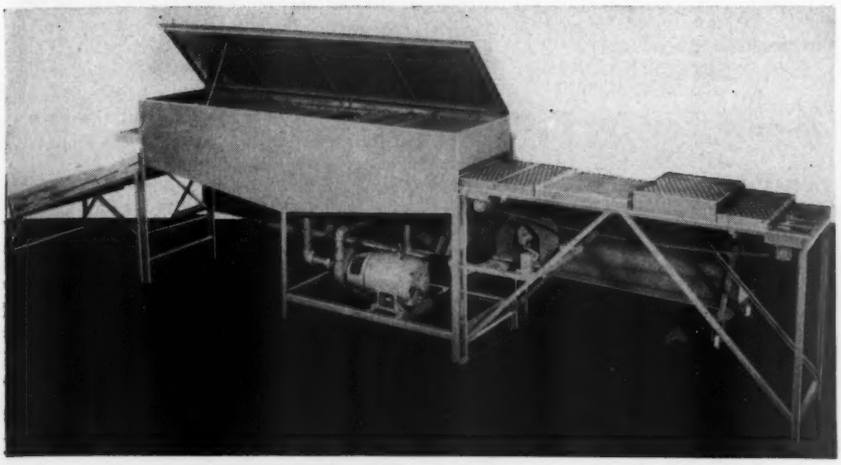
## Wire Marker for High Temperatures

A heat-resistant wire marker that withstands temperature of 400 deg. F. and which is also highly resistant to solvents,




has been introduced by the E-Z Code Division of Western Lithograph Company, Los Angeles, Calif. The marker features a thermo setting bonding agent, combined with a heat-resistant glass-cloth backing material. It has successfully passed a 500-hr. continuous heat test, which was discontinued at that time because the marker showed no indication of being affected by exposure to high temperatures. Additional features of the new material include a dielectric strength of 1,800 and an electrolytic corrosion factor of .95.

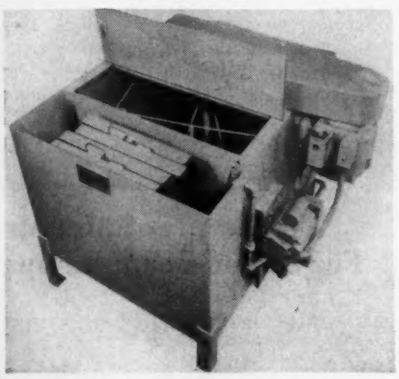
Markers will be made available on convenient carrying cards for protection against dust and dirt and for ease-of-removal as required. They will be made to special order to satisfy individual customers requirements for size, symbol, code and color specifications.



**Utility washer unit**

## Air Filter Washer and Oiler

A utility washing and oiling machine for the servicing of viscous, impingement, panel-type air filters has been marketed by the Farr Co., Los Angeles 43, Calif. The illustrated units represent a modified



**Oiler unit for air filters**

version of previous models with a considerable lower cost.

The manufacturer states that the use of the washer and oiler will reduce air filter maintenance costs by as much as 67 per cent. These units will also increase filter life, assure positive oiling and permit lower inventory of stock items.

The unit can be operated by one inexperienced man as all of the controls are automatic. It accommodates filters up to 20 in. by 28 in. by 4 in. in size.

## Paint for Battery Trays

A paint which will resist the action of the small amounts of acid which may accumulate outside storage batteries has been developed by the Electric Storage Battery Company, Philadelphia, Pa. The manufacturer states that it will dispose of the steel battery tray corrosion problem.

Sheet steel battery trays were made available just before the war, because in many instances they proved superior to wood trays. For example, the greater strength of steel trays was important, particularly for larger industrial batteries, some of which weigh up to three tons. Furthermore, since steel is not as bulky as wood, it permitted the use of larger batteries in the same space and provided a neater appearance. The greater strength of the steel trays also eliminated the need for special compartments to house battery installations in electric vehicles. Finally, steel trays were a step toward standardization of the space allotted to batteries and eliminated hand tailoring of wood trays to fit odd dimensions. The result was improved interchangeability and savings to the user. However, to capitalize on these advantages, it was necessary to find a corrosion resistant coating for the sheet steel.


**Left: Battery tray, protected with Exide's acid-resistant paint shows no corrosion after two years' service—Right: After three years' service this battery tray painted with asphaltum shows the the effects of corrosion—Paint has flaked off in large areas**

Asphalt-base paints, being porous, provided only limited resistance to corrosion. Also under rough usage, they yielded too easily to abrasion.

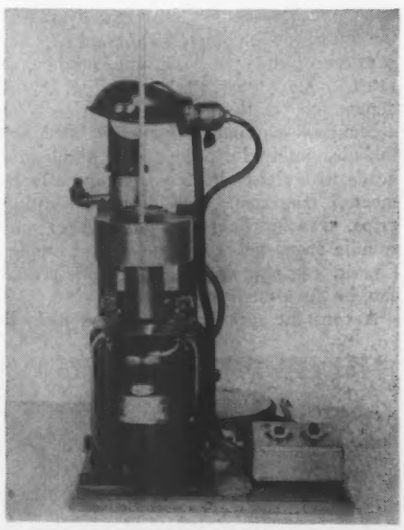
Developed originally to protect aluminum, the new coating highly resists corrosion. The manufacturer states that if, under unusual circumstances, the surface is scraped, exposing the bare steel, corrosion is limited to that area, this being due to the tight bond formed between the coating and the metal surface. As a result, corrosive action can't wedge its way between the two, but is confined to the damaged area.

The bond to the steel tray, as well as other qualities within the coating, are said to enable it to withstand mechanical abuse from blows and abrasion without flaking off. Tests indicate that the new coating holds even when the blow is heavy enough to dent the steel.

Another characteristic claimed for this coating is its high insulating quality. This protects steel trays from corrosion due to the leakage of current.

## Motor-Driven Grease Tester

A grease testing machine which simulates actual service conditions in order to



analyze performance of greases in ball and roller bearings over a wide range of temperatures is now available. It is possible to determine changes in quality, texture, consistency and color by observing grease samples in the machine during test under a high speed stroboscopic light. The unit also reveals grease tendencies toward aeration, leakage and breakdown through heat and prolonged use.

This device manufactured by The Texas Co., New York 17, consists of a high speed motor-driven shaft which operates a single-shielded ball bearing encased in an electrically heated oil bath. Temperature of the bath can be regulated from room temperature up to 300 deg. F. and higher and is indicated by a thermometer inserted in the bath well.

Test procedure starts with a charge of 5 grams of test grease to the bearing. The

greased bearing is inserted into the machine and the test is run for three min. before the heater is turned on. Observation of the grease sample is made at 25 deg. increments in temperature under stroboscopic light while the machine is running at 3,450 r.p.m.

## Automatic Nipple Threading Machines

The Landmaco No. 2 Automatic Nipple Threading machine and its companion unit the No. 2 Automatic Close Nipple Threading machine will thread, ream and chamfer nipples in a continuous automatic operation, thus eliminating secondary manual handling. Through a mechanism which transfers and turns the nipple end-for-end, these operations are performed on both ends in a continual cycle.

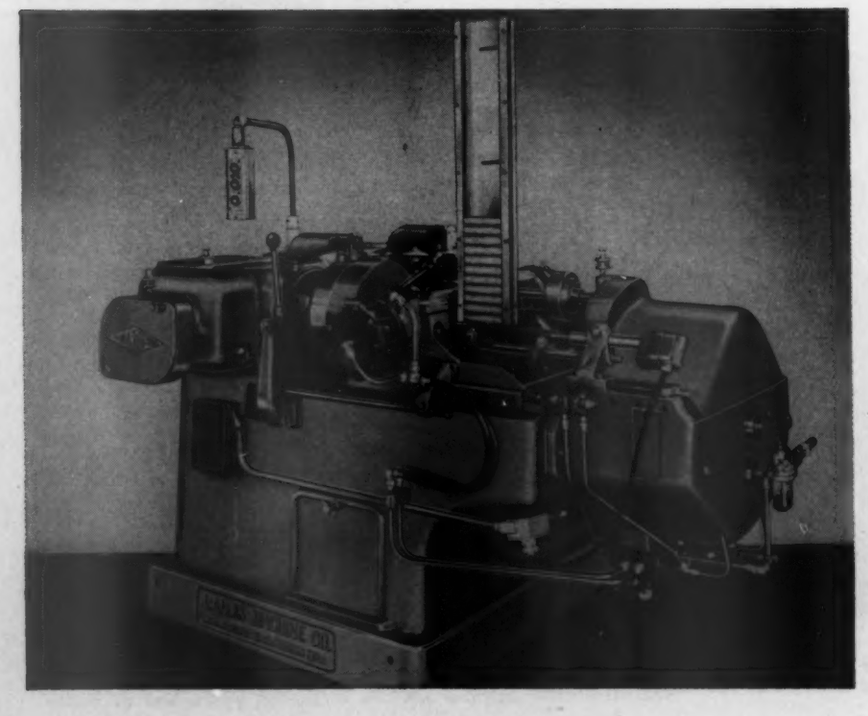
Made available by the Landis Machine Co., Waynesboro, Pa., the automatic nipple threader is designed to produce commercial standard long nipples up to 6 in. lengths. It is built with two distinct size range capacities, namely, the ½ and ¾ in. range and the 1 to 2 in. range.

Incorporating the close nipple attachment, the automatic unit will produce standard close, short and special short nipple. This machine is built with two distinct range capacities, as outlined above.

The operator is required only to give either machine visual attention and to keep the magazine charged with blanks. Regardless of the type of nipple, production rates range from 193 to 625 per hour, depending on the pipe size.

Standard equipment for both machines includes internal-trip pipe and nipple die heads with chaser holders, reaming attachments, magazine, cam segments, pipe grips, transfer fingers, plunger bars and spindle speed gears for one size of nipple. Chaser, reamers and electrical equipment can be furnished to order.

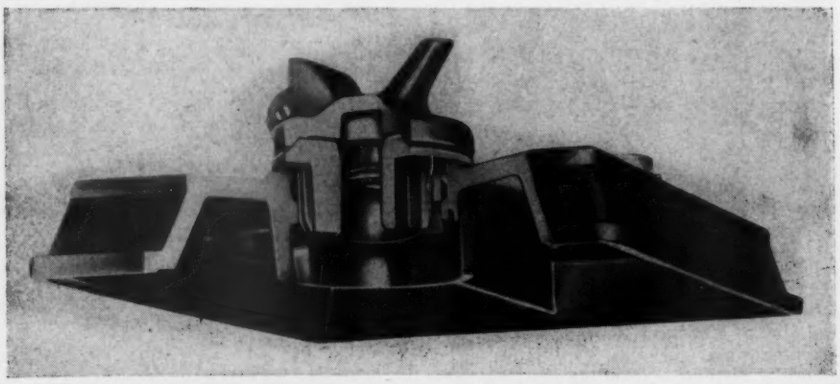
A constant speed motor with a pick-off gear box provides the required spindle speeds for the various pipe sizes within the machines' capacities.



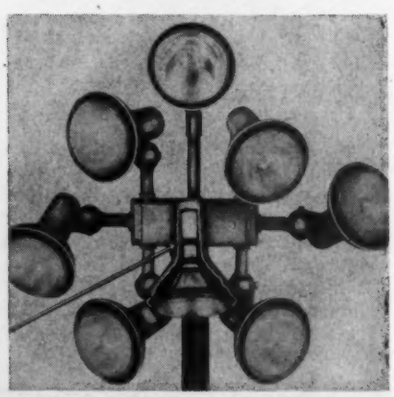
## Hinged Cap for Batteries

Gould-National Batteries Incorporated, Trenton 7, N. J., announces a loss-proof hinged vent cap, designed particularly for railroad air conditioning and car lighting batteries but also applicable to storage batteries used for other purposes. Being hinged in place, the new vent cap cannot be shaken loose or lost. If left open, the cap falls shut with normal train motion. Thus, electrolyte cannot spill from the battery nor can extraneous material fall into it.

The base of the cap fits into the hole provided for older-type vent caps. The cap itself is hinged to this base and is easily opened for the addition of water. A neoprene baffle, an integral part of the cap, closes into the opening in the base to prevent electrolyte from spilling. Two tiny pinholes in the baffle permit gas to rise above the baffle, condense, and flow back into the cell. One illustration shows the cap separately and the other as it is applied to the cell cover.



## Weatherproof Mounts For Sealed-Beam Lamps



A line of all-weather, low-cost floodlights and spotlights particularly adaptable to the outdoor lighting requirements of railroads has been announced by Magni-Lite, Inc., New York. The new lights, which are approved by Underwriters Laboratories, are designed to offer the full advantages of sealed beam lighting, economy, easy installation, and utilization of light. Made of cast silicon aluminum, they provide lamp protection, and air-cooled operation. The mounting arrangement permits their being turned in any direction.

The weatherproofing arrangement used, seals the lamp on the metal neck. Standard base 75- and 150-watt PARS lamps as

# Here's where Armco Wheel Research pays off!

Today most railroads are operating on faster, tighter schedules than ever before. This means quicker stops — and an increasing need for passenger car wheels that will resist thermal cracking and stand up under the constant pounding of severe service.

In order to meet this need *today*, Armco Technicians began a thorough and intensive program of wheel research *almost fifteen years ago*. Since that time they have developed scores of research tools — some designed to duplicate — and even surpass — the most punishing service conditions. One testing machine, for example, brakes a wrought steel wheel from 120 m.p.h. to stop in 15 seconds, with 20,000 pounds of pressure on each brake shoe.

Hundreds of tests like this have provided extremely valuable data. And this information has helped to produce the present Armco Wrought Steel Wheel — a wheel with high resistance to thermal cracking.

The use of such a wheel means not only greater safety but *more miles per wheel dollar.*

Why not get all the facts on Armco Wrought Steel Wheels? Just get in touch with our nearest district office or write us at the address below.

50th ANNIVERSARY SPECIAL PURPOSE STEELS

**ARMCO STEEL CORPORATION**

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well as the R 40 (200- and 300-watt) lamps may be used. Another series of lamp holders designed for use with mogul base 300- and 500-watt R lamps is also available.

The lamp holders completely cover the side of the lamp, thus streamlining the appearance, eliminating the distracting halo seen from the back of the holder, protecting the brittle parts of the lamp from flying stones and vandalism, and providing a simple means of adding glare shields, color lenses, wire guards, etc. Strategically placed holes drain off any precipitation accumulating around the lamp in front of the weatherproof seal and condensation from the socket or the wiring trough. All wiring is completely enclosed. Connections are made through a side-opening wiring trough.

## Transformer Paint

The Westinghouse Electric Corporation (East Pittsburgh, Pa.) has announced that the life of the finish on its pole-type distribution transformers has been more than doubled by a three-coat, mica-base paint system that has been given the name, Coastal Finish. Each coat functions co-

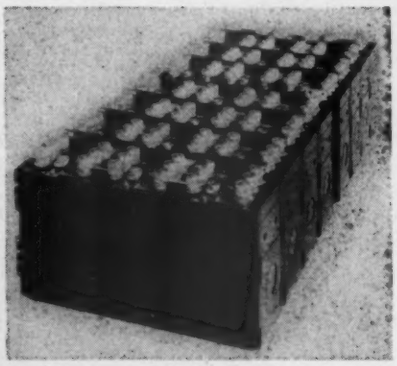
operatively with the others to withstand the oxygen, acids, salts and alkalis found in seacoast and industrial atmospheres. This three-coat system is applied in the same manner as standard finishes and in production is baked on. A modification of this system air dries, which means that it can be used to patch a transformer in the field should the surface be damaged.

The mica-base paint has been exposed to accelerated life tests in the laboratory with excellent results. Two transformer tanks, one with the three-coat, mica-base finish and one with the three-coat standard finish were exposed to a 20-per cent solution of sodium chloride at 90 deg. F. with 15 lb. pressure for 1,000 hours. The standard finish on the tank shown at the right in the illustration shows severe corrosion. The finish was completely gone from the cover and from many areas on the tank walls. The mica-base finish on the tank at the left shows no signs of deterioration or corrosion. Exceptional resistance has been found in other tests such as repeated exposures to acids and alkalis and to fog and ultraviolet light.

Panels with the three-coat standard finish and with the three-coat, mica-base finish were exposed on both Florida and California coasts. At the end of 18 months of exposure none of the mica-base panels had shown signs of corrosion. The standard panels showed edge corrosion and rust creepage for approximately 1/16 in. in from the edge. Some chalking had taken place on both panels.

## Nickel Cadmium Battery

A new T-type nickel cadmium alkaline battery, designed specifically for starting railroad Diesel engines is being manufactured by the Nickel Cadmium Battery Corporation, Easthampton, Mass. It is light in



weight and requires no additional space or alteration in existing battery racks.

It is available in two capacities: Model THR-30, 142 amp. hr., in eight 6-cell trays, which is interchangeable with 17-plate, 284 amp.-hr. conventional batteries, and Model THR-44, 210 amp. hr., which is interchangeable with 25-plate, 426 amp.-hr. conventional batteries. Model THR-30 weighs 1,825 lb., and Model THR-44 weighs 2,675 lb.

The manufacturer states that the battery has inherently long life, and that it will maintain its capacity after years of severe use.

Other characteristics cited by the maker are all-steel construction which eliminates breakage, ability to be overcharged without damage and negligible water consumption. The battery can also be charged with standard charging equipment at trickle, normal, or high rates. Overcharging will not harm the battery.

Due to low internal resistance, the T-type Nicad battery has an exceptionally high ampere rate of discharge at useful voltage which is important in engine-starting applications.

## Respirator Hood

Light and comfortable, the illustrated hood incorporates a model R2000 respirator which protects the user against a variety of dusts or gases by means of seven specific cartridges. Design assures full and free movement of the head and neck. This flyweight unit, designated the model No. 75, has been developed by the American Optical Co., Southbridge, Mass.

Manufactured of white nylon, olive green

twill or white muslin, the hood provides protection for eyes, head, neck, shoulders and respiratory organs. Two drawstrings tieing under the wearers' arms assure a snug fit.

Other features include a 10 in. window of clear cellulose acetate which gives unobstructed frontal vision. Lateral vision is perfect. Though not designed for impact resistance, the window is thick enough to provide full protection against the hazards of dust and paint spraying for which it is intended.

The respirator hood is reinforced with leather in four places for long wear and service. A 2¼ x 4 in. elastic strap sewn into the back of the hood assures a snug fit for various head sizes.

## Carbon Dioxide Fire Extinguisher

To forestall a fire disaster, with its consequences of lost time, money and production, American-LaFrance-Foamite Corp., Elmira, N. Y., has introduced a quick-reaction carbon-dioxide system. It affords protection of class B and C risks in closed vaults or other similar storage type rooms, and is adaptable for fire protection of Diesel locomotives which include both B and C hazards.

Alfco gas release mechanisms—there are several types available—function instantaneously when fire causes a sudden rise in temperature. At the outbreak of fire, dense clouds of carbon-dioxide gas flood the area, chocking flames promptly.

It is easily installed and can be located adjacent to the risk or remote from it, as desired. Should additional protection become necessary, extra cylinders can be added without difficulty. No special parts are required for recharging.

In conjunction with the carbon-dioxide system, their window and door closing mechanism is invaluable. This device works simultaneously with the gas discharge mechanism, cutting off outside supplies of fresh air which might dilute the gas and impair its effectiveness. These units are engineered for hinged or sliding doors, double or single type, and for different types of windows.

(*Continued on page 772*)

# "AXLES—the Backbone of Truck Safety...



Magnaglo indication glows under black light to clearly disclose a non-visible crack in axle at wheel fit.

## YET, a 'HAIR-LINE' CRACK, UNDETECTED, Can Impair the Safety of an Entire Train"

***A prominent committee on car maintenance reports:***

**"... axles are the backbone of truck safety. There is no item upon which so much depends as on the axle. Extreme care must be taken in their handling, machining, mounting and inspection. The safety of an entire train can be impaired by a 'hair-line' crack or nick that goes undetected"**

Magnaflux Corporation keeps specially trained engineers in the field at all times as a special service to users of Magnaflux and Magnaglo inspection equipment. Their regular calls on railroad shops provide a constant check on operator techniques, and inspection procedure. Their advice is available to help solve any special inspection problems.

Magnaflux* inspection with Magnaglo is non-destructive, fast, accurate—the one sure safeguard that keeps defective *axles* from ever going back into service when wheels are stripped.

For other car parts too, such as couplers, side frames, bolsters, brake rigging, etc., Magnaflux inspection will show every tiny crack . . . and, at production line speed. 'Specially built Magnaflux units for railroad car shops will help you to increase the economy of your operations and contribute to the safety of your rolling stock.

Find out about all the benefits of Magnaflux inspection of axles and all car parts. Write today for full particulars.

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# NEWS

## Frisco Opens New Yard and Shops

THE new multi-million dollar Springfield yard and Diesel shops of the St. Louis-San Francisco were opened early in November at Springfield, Mo. President Clark Hungerford dedicated the new facilities in a ceremony held at the shops before several hundred business and civic leaders as well as by directors and officers of the railroad.

## Railroads Dust Off "Help Wanted" Signs

As a result of stepped up defense preparations, the railroads have recalled large numbers of furloughed employees. The Railroad Retirement Board has reported that in some instances shortages of telegraphers, train dispatchers and journeyman mechanics have already arisen. To meet the situation, the board has spread the word to newspapers and to railway labor organizations outlining the need for more personnel. Experienced carmen, the board said, are urgently needed in many parts of the country in connection with freight car repair and car-building programs. Other tradesmen in short supply are machinists, pipefitters, hammersmiths and boilermakers.

## Freight-Car Program Established by N. P. A.

THE National Production Authority on October 26 established a program to provide steel products in sufficient quantities during the first quarter of 1951 to build new freight cars at the rate of 10,000 a month, as well as for "adequate" repair and maintenance of the present fleet. The program, established by Supplement No. 1 to N.P.A. Order M-1, will provide approximately 310,000 tons of steel products per month to car builders and railroad repair shops during the first three months of next year.

N.P.A.'s approval of the program came after discussions with D.T.A., other government agencies, and representatives of the steel, railroad, and car building industries. The established procedure calls for issuance by N.P.A. of individual directives to steel producers to accept certified orders for production and delivery of steel for construction and repair of freight cars. These directives will specify the tonnage of each steel product to be shipped in the months designated.

Contract builders, railroad shops, and manufacturers of component parts will place the certified orders with steel producers. Such orders, however, must not call for amounts of steel in excess of that actually required to complete new-car contracts and repair schedules which were firm before the orders were placed with steel producers. The certification to the latter will read as follows: "Certified that the material called for in this order is to be used only in connection with the Freight-Car Program under N.P.A. Supplement 1, Order M-1."

Producers of steel are not required to accept certified orders under the program which are received less than 45 days prior to the first day of the month in which shipment is requested, unless specifically requested to accept such orders by N.P.A. When steel production has been scheduled pursuant to directives issued under the program, these schedules must be maintained unless N.P.A. directs otherwise.

There are also provisions for assistance to those who are unable to place certified orders. They stipulate that such situations should be reported to N.P.A.'s Iron and Steel Division, the reports "specifying the producers who refuse to accept this order." There is also another provision stipulating that nothing in the order shall prevent railroads, private car companies or common carriers "from making their own repairs or construction of freight cars."

## SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

| Item No. | | Month of July 1950 | Month of July 1949 | Seven months ended with July 1950 | Seven months ended with July 1949 |
|---|---|---|---|---|---|
| 3 | Road locomotive miles (000) (M-211): | | | | |
| 3-05 | Total, steam | 28,800 | 30,916 | 194,149 | 242,179 |
| 3-06 | Total, Diesel-electric | 17,660 | 13,028 | 115,356 | 82,730 |
| 3-07 | Total, electric | 803 | 736 | 5,646 | 5,780 |
| 3-04 | Total, locomotive-miles | 47,271 | 44,681 | 315,182 | 330,691 |
| 4 | Car-miles (000,000) (M-211): | | | | |
| 4-03 | Loaded, total | 1,640 | 1,449 | 10,680 | 10,477 |
| 4-06 | Empty, total | 855 | 864 | 5,758 | 6,102 |
| 6 | Gross ton-miles-cars, contents and cabooses (000,000) (M-211): | | | | |
| 6-01 | Total in coal-burning steam locomotive trains | 47,800 | 48,700 | 316,052 | 384,347 |
| 6-02 | Total in oil-burning steam locomotive trains | 14,971 | 16,643 | 84,320 | 105,782 |
| 6-03 | Total in Diesel-electric locomotive trains | 50,076 | 37,123 | 325,182 | 236,860 |
| 6-04 | Total in electric locomotive trains | 2,150 | 1,961 | 14,829 | 15,656 |
| 6-06 | Total in all trains | 114,127 | 102,436 | 740,522 | 742,689 |
| 10 | Averages per train-mile (excluding light trains) (M-211): | | | | |
| 10-01 | Locomotive-miles (principal and helper) | 1.05 | 1.05 | 1.05 | 1.06 |
| 10-02 | Loaded freight car-miles | 38.90 | 36.30 | 37.90 | 35.70 |
| 10-03 | Empty freight car-miles | 20.20 | 21.60 | 20.40 | 20.80 |
| 10-04 | Total freight car-miles (excluding caboose) | 59.10 | 57.90 | 58.30 | 56.50 |
| 10-05 | Gross ton-miles (excluding locomotive and tender) | 2,704 | 2,564 | 2,625 | 2,532 |
| 10-06 | Net ton-miles | 1,232 | 1,126 | 1,183 | 1,146 |
| 12 | Net ton-miles per loaded car-mile (M-211) | 31.70 | 31.00 | 31.30 | 32.10 |
| 13 | Car-mile ratios (M-211): | | | | |
| 13-03 | Per cent loaded of total freight car-miles | 65.70 | 62.70 | 65.00 | 63.20 |
| 14 | Averages per train hour (M-211): | | | | |
| 14-01 | Train miles | 17.10 | 17.10 | 17.00 | 16.90 |
| 14-02 | Gross ton-miles (excluding locomotive and tender) | 45,681 | 43,304 | 44,084 | 42,198 |
| 14 | Car-miles per freight car day (M-240): | | | | |
| 14-01 | Serviceable | 45.20 | 40.90 | 43.60 | 42.40 |
| 14-02 | All | 42.30 | 38.30 | 40.60 | 40.10 |
| 15 | Average net ton-miles per freight car-day (M-240) | 882 | 746 | 824 | 813 |
| 17 | Per cent of home cars of total freight cars on the line (M-240) | 38.00 | 51.80 | 44.30 | 50.50 |

PASSENGER SERVICE (DATA FROM I. C. C. M-213)

| | | | | | |
|---|---|---|---|---|---|
| 3 | Road motive-power miles (000): | | | | |
| 3-05 | Steam | 12,377 | 15,655 | 80,613 | 114,761 |
| 3-06 | Diesel-electric | 15,164 | 13,529 | 99,486 | 86,021 |
| 3-07 | Electric | 1,640 | 1,662 | 11,157 | 11,745 |
| 3-04 | Total | 29,181 | 30,851 | 191,257 | 212,640 |
| 4 | Passenger-train car-miles (000): | | | | |
| 4-08 | Total in all locomotive-propelled trains | 281,257 | 293,952 | 1,833,835 | 1,977,191 |
| 4-09 | Total in coal-burning steam locomotive trains | 64,680 | 80,256 | 411,667 | 602,826 |
| 4-10 | Total in oil-burning steam locomotive trains | 39,434 | 48,881 | 249,759 | 313,339 |
| 4-11 | Total in Diesel-electric locomotive trains | 160,092 | 147,103 | 1,052,462 | 932,427 |
| 12 | Total car-miles per train-miles | 9.51 | 9.36 | 9.37 | 9.12 |

YARD SERVICE (DATA FROM I.C.C. M-215)

| | | | | | |
|---|---|---|---|---|---|
| 1 | Freight yard switching locomotive-hours (000): | | | | |
| 1-01 | Steam, coal-burning | 1,357 | 1,575 | 9,699 | 13,308 |
| 1-02 | Steam, oil-burning | 259 | 257 | 1,623 | 2,007 |
| 1-03 | Diesel-electric[1] | 2,525 | 2,030 | 16,657 | 13,491 |
| 1-06 | Total | 4,166 | 3,887 | 28,160 | 28,991 |
| 2 | Passenger yard switching hours (000): | | | | |
| 2-01 | Steam, coal-burning | 56 | 86 | 421 | 680 |
| 2-02 | Steam, oil-burning | 13 | 14 | 90 | 113 |
| 2-03 | Diesel-electric[1] | 234 | 217 | 1,565 | 1,428 |
| 2-06 | Total | 339 | 353 | 2,312 | 2,465 |
| 3 | Hours per yard locomotive-day: | | | | |
| 3-01 | Steam | 7.90 | 7.30 | 7.70 | 8.60 |
| 3-02 | Diesel-electric | 17.00 | 17.00 | 17.20 | 17.50 |
| 3-05 | Serviceable | 13.80 | 12.80 | 13.80 | 13.40 |
| 3-06 | All locomotives (serviceable, unserviceable and stored) | 11.80 | 10.50 | 11.50 | 11.30 |
| 4 | Yard and train-switching locomotive-miles per 100 loaded freight car-miles | 1.75 | 1.85 | 1.82 | 1.91 |
| 5 | Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives) | 0.75 | 0.75 | 0.78 | 0.77 |

[1] Excludes B and trailing A units.

# SUPPLY TRADE NOTES

SIMMONS-BOARDMAN PUBLISHING CORPORATION.—Samuel O. Dunn, chairman of the Simmons-Boardman Publishing Corporation—publishers of the *Railway Mechanical and Electrical Engineer* and other transportation and building publications—has at his own request relinquished the duties of that office and has been designated chairman emeritus, in which position he will continue in the active service of the company in an advisory capacity, with headquarters in the company's Chicago office as heretofore. Executive duties devolving upon the chairman have been assigned to the president of the company, James G. Lyne, who will continue also as editor of the Railway Age.

◆

PRESSED STEEL CAR COMPANY.—The Pressed Steel Car Company has reopened its Mount Vernon, Ill., freight-car building plant after a shutdown of more than a year. The plant opened with a backlog of 5,950 cars, according to John I. Snyder, Jr., president, sufficient to engage the plant's entire production for at least one year. A second plant at Hegewisch, Ill., is being tooled up to produce the company's new lightweight freight car, the "Unicel."

◆

HUNT-SPILLER MANUFACTURING COMPANY.—*William E. Mulcahy*, recently with the Boston Electro Steel Company, has rejoined the Hunt-Spiller Manufacturing Corporation, Boston, Mass., as assistant foundry superintendent.

◆

KOPPERS COMPANY.—*A. H. Engstrom* has been appointed acting engineering manager for American hammered piston rings manufactured by the Metal Products Division of the Koppers Company. Mr. Engstrom formerly was assistant to the manager of the American Hammered Piston Ring engineering and research department, *Dr. Tracy Jarrett*, who resigned because of ill health.

Mr. Engstrom received a B.S. degree in mechanical engineering from the University of Southern California. Before joining Koppers in February, 1950, he was in charge of Diesel production, testing, and service for Continental Motors in Muskegon, Mich. He also was previously associated with Tri-State Railways in Detroit, Mich., as a Diesel technician.

◆

TAYLOR-WHARTON IRON & STEEL CO.—*Robert D. Hill* has been elected vice-president of the Taylor-Wharton Iron & Steel Co. He will continue to serve also as treasurer.

◆

IRVINGTON VARNISH & INSULATOR CO.—*L. V. Henderson*, 140 Walker Street, S. W., Atlanta 3, Ga., has been appointed south-

## ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE NOVEMBER ISSUE

### DIESEL-ELECTRIC LOCOMOTIVE ORDERS

| *Road* | *No. of units* | *Horse-power* | *Service* | *Builder* |
|---|---|---|---|---|
| Ann Arbor | 14[1] | 1,600 | Freight | Alco-G. E. |
| | 2[1] | 1,000 | Road switch | Alco-G. E. |
| | 4[1] | 660 | Switching | Alco-G. E. |
| Chicago & Eastern Illinois | 6[2] | 1,500 | General purpose | Electro-Motive |
| Chicago, Milwaukee, St. Paul & Pacific | 6[3] | 4,800 | Freight | Fairbanks-Morse |
| Chicago, Rock Island & Pacific | 8[4] | 1,500 | Freight | Electro-Motive |
| | 6[4] | 2,250 | Passenger | Electro-Motive |
| Duluth, South Shore & Atlantic | 1[5] | 1,000 | Road switch | Alco-G. E. |
| Long Island | 4[6] | 2,400 | Passenger | Fairbanks-Morse |
| | 8[6] | 1,600 | Passenger | Fairbanks-Morse |
| Louisville & Nashville | 22[7] | 1,500 | General purpose | Electro-Motive |
| | 4[7] | 2,250 | Passenger | Electro-Motive |
| Minneapolis, St. Paul & Sault Ste Marie | 4 | 1,500 | Passenger | Electro-Motive |
| | 6 | 1,500 | Freight | Electro-Motive |
| | 2 | 1,500 | Road switch | Electro-Motive |
| | 2 | 1,500 | Road switch | Baldwin Loco. |
| | 1 | 1,500 | Road switch | Alco-G. E. |
| | 5 | 1,000 | Switch | Alco-G. E. |
| Spokane, Portland & Seattle | 4[8] | 1,600 | Road switch | Alco-G. E. |

### FREIGHT-CAR ORDERS

| *Road* | *No. of cars* | *Type of car* | *Builder* |
|---|---|---|---|
| Akron, Canton & Youngstown | 150[9] | 50-ton box | Pullman-Standard |
| American Refrigerator Transit Co. | 500[10] | Refrigerator | Company shops |
| Atlantic Coast Line | 500 | 50-ton box | American Car & Fdry. |
| | 800 | 50-ton gondola | American Car & Fdry. |
| | 100 | 70-ton gondola | American Car & Fdry. |
| | 100 | 70-ton hopper | Greenville Steel Car |
| Baltimore & Ohio | 1,000 | 50-ton hopper | American Car & Fdry. |
| | 1,000 | 50-ton hopper | General American |
| | 1,000 | 50-ton hopper | Pullman-Standard |
| | 1,000 | 50-ton hopper | Bethlehem Steel |
| Burlington Refrigerator Express Co. | 350[11] | Refrigerator | C. B. & Q. shops |
| Canadian Pacific | 1,900 | 50-ton box | Canadian Car & Fdry. |
| | 350 | Auto.-box | Canadian Car & Fdry. |
| | 100 | Flat | Canadian Car & Fdry. |
| | 800 | 50-ton box | National Steel Car |
| | 350 | Refrigerator | National Steel Car |
| | 50 | Covered hopper | National Steel Car |
| | 500 | 50-ton box | Eastern Car |
| | 300 | Gondola | Eastern Car |
| | 225 | Hopper | Eastern Car |
| Chicago & Eastern Illinois | 25[12] | Flat | Thrall Car |
| | 25[13] | Covered hopper | Thrall Car |
| Chicago, Burlington & Quincy | 1,000[11] | Box | Company shops |
| | 400[11] | Flat | Company shops |
| | 200[11] | Hopper | Company shops |
| | 250[11] | Gondola | Company shops |
| Chicago Great Western | 600 | Box | Pullman-Standard |
| | 300 | Gondolas | Pullman-Standard |
| | 150 | Flat | American Car & Fdry. |
| Colorado & Southern | 250[11] | Box | C. B. & Q. shops |
| Duluth, Missabe & Iron Range | 300[13] | 70-ton hopper | Pullman-Standard |
| Fort Worth & Denver City | 250[1] | Box | C. B. & Q. shops |
| Georgia | 50[14] | 50-ton box | Pullman-Standard |
| Great Northern | 1,000[15] | 50-ton box | Company shops |
| Illinois Terminal | 10[16] | 50-ton box | American Car & Fdry. |
| Kansas City Southern | 600[17] | 70-ton gondola | Pullman-Standard |
| | 400[17] | 50-ton box | American Car & Fdry. |
| Maine Central | 250[18] | 50-ton box | Pullman-Standard |
| Minneapolis & St. Louis | 700[19] | 50-ton box | General American |
| | 100[19] | 50-ton flat | General American |
| Nashville, Chattanooga & St. Louis | 650[20] | 50-ton box | Pullman-Standard |
| New York Central | 1,000[21] | 55-ton hopper | American Car & Fdry. |
| | 1,000[21] | 55-ton hopper | Pullman-Standard |
| | 1,000[21] | 70-ton hopper | General American |
| | 500[21] | 70-ton hopper | Greenville Steel Car |
| | 1,000[21] | 70-ton hopper | Bethlehem Steel |
| | 2,500[21] | Box | Despatch Shops |
| Northern Pacific | 250[22] | 70-ton gondola | American Car & Fdry. |
| St. Louis-San Francisco | 200[23] | 50-ton gondola | Pressed Steel Car |
| St. Louis Southwestern | 75[24] | 70-ton covered hopper | American Car & Fdry. |
| Spokane, Portland & Seattle | 200[25] | 50-ton flat | Pacific Car & Fdry. |
| Sunray Oil Corporation | 200 | Tank | American Car & Fdry. |
| Texas & Pacific | 250[26] | 70-ton hopper | American Car & Fdry. |
| | 100[26] | 70-ton covered hopper | American Car & Fdry. |
| | 200[26] | 50-ton box | Pressed Steel Car |
| | 100[26] | 50-ton flat | Company shops |
| | 150[26] | 70-ton gondolas | Company shops |
| Western of Alabama | 110[27] | 50-ton box | Pullman-Standard |
| Western Pacific | 600[28] | 50-ton box | Pullman-Standard |

### FREIGHT-CAR LEASES

| | | | |
|---|---|---|---|
| Atlantic Coast Line | 500[29] | 50-ton flat | Pullman-Standard |
| Boston & Maine | 750 | 50-ton box | Pullman-Standard |

### PASSENGER-CAR ORDERS

| *Road* | *No. of cars* | *Type of car* | *Builder* |
|---|---|---|---|
| New York, Susquehanna & Western | 16[30] | Coaches | Budd Co. |
| Spokane, Portland & Seattle | 2 | Sleeping | Pullman-Standard |
| | 1 | Coach | Pullman-Standard |

[1] For November and December delivery.
[2] To cost $900,000. For December and January delivery.
[3] Delivery scheduled for April, 1951.
[4] Freight units scheduled for May, 1951, delivery. Three passenger units to be delivered in June and three in July.
[5] Estimated cost $107,000. Delivery scheduled for January.
[6] The request for permission to purchase these units is referred to in a note at the end of the order table on page 703 of the November issue.
[7] Deliveries of the 1,500-hp. units expected to begin in January and to be completed in May. The other

*(Continued on page 762)*

## ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE NOVEMBER ISSUE—*(Continued)*

units are scheduled for delivery in June and July, 1951.
[8] For December delivery.
[9] Estimated cost $780,000. Delivery scheduled for April, 1951.
[10] To cost $5,000,000.
[11] Plans to acquire this equipment were announced in the November issue, page 703 (see Notes to table of orders).
[12] Deliveries expected during the first quarter of 1951.
[13] For delivery during the second quarter of 1951.
[14] Estimated cost $260,000. Deliveries expected during the third quarter of 1951.
[15] The Great Northern will also acquire 100 covered hopper cars from a commercial car builder. Both groups of cars are scheduled for delivery in 1951.
[16] Deliveries expected during the third quarter of 1951.
[17] Deliveries expected to begin next July.
[18] For delivery next March.
[19] For delivery during the second quarter of 1951.
[20] To cost $3,380,000. Delivery scheduled for mid 1951.
[21] One thousand box cars and 500 gondola cars for the Pittsburgh & Lake Erie. The Central has inaugurated a 53-hr. work week for employees of its four major freight-car repair shops, to provide immediately a maximum number of available cars. The 2,300 men employed in repair shops at Buffalo, N. Y., Beech Grove, Ind., Avis, Pa., and Ashtabula, Ohio, are now working nine hours daily and eight hours on Saturday.
[22] Estimated cost $1,300,000. Delivery scheduled for July, 1951.
[23] For delivery during the second quarter of 1951.
[24] The St. L. S. W. originally contemplated ordering only 25 cars, as reported in the November issue.
[25] For delivery beginning next July.
[26] Delivery of the hopper cars expected during the third and fourth quarters of 1951; the box cars, during third quarter of 1951. The flat and gondola cars will be built in the company's shops as soon as material is available.
[27] Delivery scheduled for the third quarter of 1951. Estimated cost $572,000.
[28] Three hundred cars scheduled for delivery in September, 1951, and 300 in October. Approximate cost $3,250,000.
[29] To be leased from the Equitable Life Assurance Society. These are in addition to the 700 pulpwood cars reported in the May issue.
[30] To be leased from the Equitable Life Assurance Society. Delivery scheduled for March, 1951.
[31] Estimated cost $1,220,000. Delivery expected about mid 1951.

NOTES:

*Missouri Pacific Lines.*—The Missouri Pacific Lines have been authorized to spend almost $18,000,000 for 124 Diesel-electric locomotive units and 7 planetarium dome coaches. Included in the order will be 7 three-unit 4,500-hp. and 4 two-unit 3,000-hp. freight locomotives; 5 two-unit 3,000-hp. and 22 one-unit 1,500-hp. road-switching locomotives; three two-unit 4,000-hp. passenger locomotives, and 37 one-unit 1,200-hp. switching locomotives. All these locomotives are for the Missouri Pacific. For the Gulf Coast Lines the purchases will include 7 one-unit 1,500-hp. road-switching and 5 one-unit 1,200-hp. switching locomotives. For the International-Great Northern there will be 8 one-unit 1,500-hp. switching locomotives. Under present plans the Missouri Pacific's entire switching operation at Kansas City will de dieselized. New locomotive acquisitions also will make it possible to dieselize entirely lines from Kansas City to Omaha and from Kansas City to Pueblo, Colo., and increase materially diesel locomotive usage on other principal routes of the company's lines between St. Louis and the Southwest and between St. Louis and Kansas City. Most passenger trains on the latter route now are Diesel-powered. On Texas lines receipt of the new locomotives will result in complete Dieselization of all mileage from Palestine through San Antonio to Laredo and Corpus Christi, and of all lines in the "Winter Garden" district of south Texas. All lines in the lower valley of the Rio Grande south of Kingsville also will be dieselized when the new equipment is received. When all the new power is received there will be only a few of the M. P.'s principal passenger trains not operated by Diesel power; more than 66 per cent of the railroad's tonnage will be Diesel hauled. When all units in the new order have been received, Mr. Neff estimated that it will be "possible for the M. P. to retire an additional 157 steam locomotives."

*Pittsburg & Shawmut.*—The P. & S. has placed an order for rebuilding 200 hopper cars with the international Railway Car & Equipment Manufacturing Co. The project will require approximately 800 tons of steel, effecting a saving, compared with building new cars, of about 2,800 tons.

ern states representative of the Irvington Varnish & Insulator Co., Irvington, N. J. Mr. Henderson will handle Irvington products for Florida, Alabama, Georgia, and most of Tennessee.

◆

BALDWIN-LIMA-HAMILTON CORPORATION.—Marvin W. Smith, president of the Baldwin Locomotive Works, and G. A. Rentschler, chairman of the executive committee of Lima-Hamilton Corporation, have announced that the Boards of Directors of their respective companies have declared effective the previously announced agreement and plan of reorganization whereby Baldwin will change its name to Baldwin-Lima-Hamilton Corporation and acquire all of the assets of Lima-Hamilton in exchange for stock of Baldwin-Lima-Hamilton. Pursuant to this reorganization plan, Baldwin is transferring to the newly organized Baldwin Securities Corporation, its stock in the Midvale Company and in General Steel Castings Corporation and the cash derived by Baldwin from the sale earlier this year of its stock in Flannery Bolt Company, in exchange for which Baldwin is receiving all of the shares of Baldwin Securities Corporation stock.

◆

DAVENPORT-BESLER CORPORATION.—The *H. K. Porter Company* has sold its locomotive business, including patterns, drawings, and spare parts business, to the Davenport-Besler Corporation (Davenport Locomotive Works), Davenport, Iowa. Davenport-Besler will service all Porter locomotives now in use and also build duplicate Porter locomotives, including Porter fireless locomotives.

◆

TIMKEN ROLLER BEARING COMPANY.—The New York offices of the Railway Division of the Timken Roller Bearing Company have been moved to 150 Broadway, New York 7.

◆

INLAND STEEL COMPANY.—The railroad division and pig-iron and coal-chemicals division of the sales department of Inland Steel have been consolidated, in charge of *John J. Davis, Jr.*, who has been sales manager of the separate divisions. *L. C. Reed* and *A. C. Engh* have become assistant managers of sales, respectively, of railroad products and of pig iron and chemicals.

◆

HULSON COMPANY.—*William K. Durbon* has been appointed vice-president of the Hulson Company, with headquarters at Chicago, succeeding *J. R. Gillette*, resigned.

◆

GENERAL ELECTRIC COMPANY.—*Allan L. Davis* has been appointed manager of service of the transportation divisions of the General Electric Company's apparatus department in Schenectady, N. Y. The position is newly created and will be one of evaluating and analyzing service requirements for the transportation industry.

Mr. Davis joined G. E. as service engineer in the Los Angeles, Calif., office in 1945. He later was appointed transportation engineer and, in May, 1947, was transferred to Schenectady as manager of the Alco-GE service engineering division, the position he held until his appointment as manager of service.

◆

GEORGIA-PACIFIC PLYWOOD & LUMBER CO.—*R. J. Schneider* has been appointed manager, railroad materials department, of the Georgia-Pacific Plywood & Lumber Co., Augusta, Ga., with headquarters at 332 South Michigan avenue, Chicago. Mr. Schneider formerly was vice-president of the Berwyn Lumber Company of Chicago, with which he was associated for 15 years. Before that time he was sales manager for the Chicago Lumber Sales Company.

**R. J. Schneider**

◆

AMERICAN LOCOMOTIVE COMPANY.—*Hunter Michaels* has been elected a vice-president of the American Locomotive Company.

◆

VAPOR HEATING CORPORATION.—*J. T. Elwood*, sales representative, serving railroads in Texas and Louisiana, for the Vapor Heating Corporation, with headquarters at Houston, Tex., has been transferred to Chicago, where he will be in sales, working out of the main office. Succeeding Mr. Elwood at Houston is *P. M. Higgins*, who has been working with railroads out of the St. Louis, Mo., office. *R. M. Teichler*, who has been working out of the main plant at Chicago, succeeds Mr. Higgins at St. Louis.

◆

GRIP NUT COMPANY.—*John H. McCartney* has been appointed regional sales engineer, Eastern territory, of the Grip Nut Company. Mr. McCartney will handle matters of sales and service work directly from the company's Chicago office.

◆

GARLOCK PACKING COMPANY.—*Charles F. Palmer, Jr.*, formerly district manager of the Garlock Packing Company, at St. Louis, Mo., has been appointed district manager at Philadelphia, Pa., succeeding

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This new Johns-Manville insulation really keeps heat in its place—inside the car heating pipes where you want it!

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**FITS TIGHT—STAYS TIGHT**—The twisted asbestos fibres that form the insulating medium of Thermo-Wrap fit snugly against the pipe. These fibres are of such length and are twisted in such a manner that they will not loosen on the pipe because of vibration.

**EASY TO INSTALL**—Thermo-Wrap is designed so that it can be quickly and easily applied on straight and curved piping. Lacing hooks, properly spaced, facilitate installation and assure a lock-tight longitudinal joint. A double-type overlap at this joint provides complete closure and a permanent weather seal.

**STANDARD SIZES AND FITTINGS**—Thermo-Wrap is available in standard 36″ sections, in thicknesses of 1″, 1½″ and 2″ for standard and extra heavy pipe from ¾″ up and for tubing from ⅞″ up. Special insulation fittings are available for tees, 45° and 90° ells, and crossovers.

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JOHNS-MANVILLE JM PRODUCTS

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the late Leo P. Duggan. *A. C. Gustafson*, formerly representative at Houston, Tex., has been appointed district manager at St. Louis, to succeed Mr. Palmer.

◆

WYANDOTTE CHEMICALS CORPORATION.—*Sidney Grandy* has been appointed to the Wyandotte Atlanta, Ga., office, 443 Hurt Building, to sell Wyandotte railway cleaners in southern United States.

Mr. Grandy has served in the executive

**S. Grandy**

committee of the Georgia Branch of American Society for Metals and is active in the Southern and Southwestern Railway Club, the Southeastern Railway Diesel Club and the Railway Air Conditioning Club.

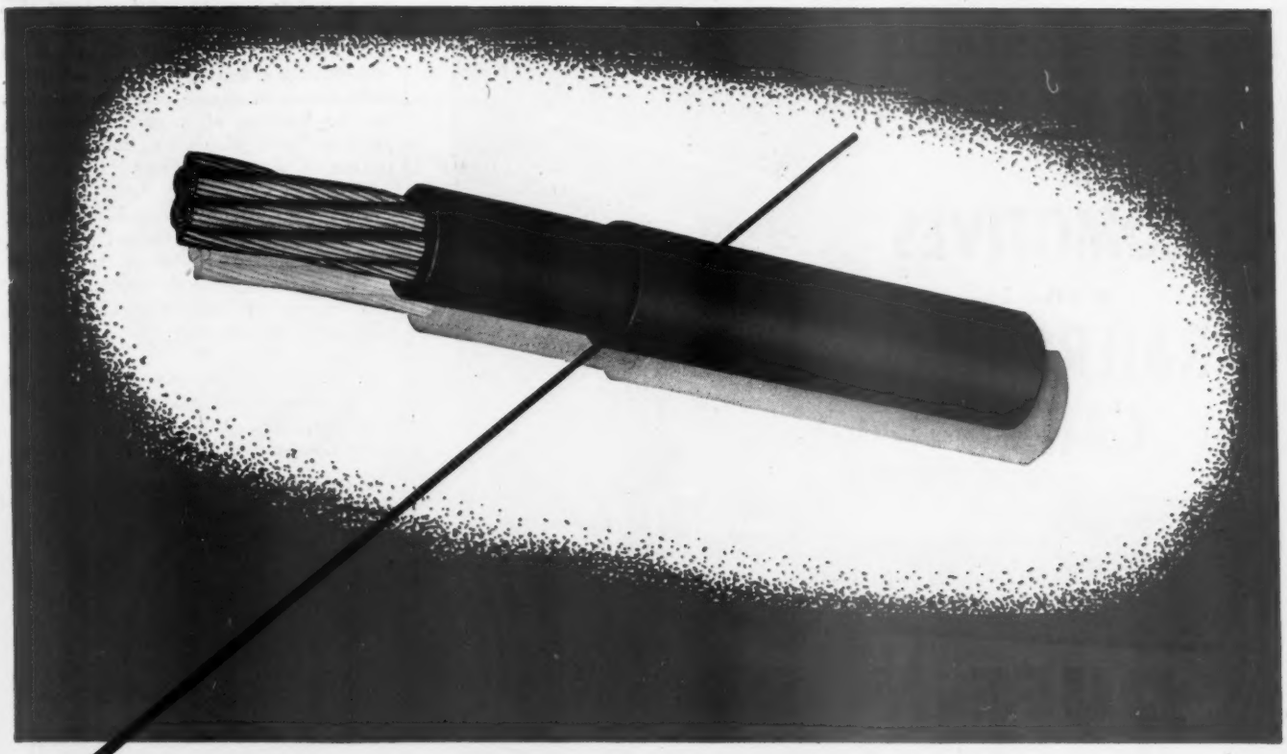
◆

SKF INDUSTRIES, INC.—*Richard H. DeMott* has been elected president of SKF Industries, Inc., succeeding *William L. Batt*, who has resigned to re-enter government service as chief of the Economic Cooperation Administration mission to the United Kingdom.

Mr. DeMott, who has been vice president in charge of sales since 1943, was

**R. H. DeMott**

born in Tenafly, N. J., and is a graduate of the Stevens Institute of Technology (1908). His first job was as an apprentice with a pump company. He became a draftsman, then a salesman, and finally a power company engineer before joining SKF in 1915. A year later, he was appointed district manager of the company's New York sales office. In 1921, he set up a department of industrial development to broaden



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the use of bearings in industry. From 1923 to 1928 he served as assistant sales manager and from 1928 to 1942 as general sales manager. During World War II, Mr. DeMott was in charge of all negotiations for the building of a government-owned plant at North Wales, Pa., for the manufacture of aircraft bearings.

◆

BULLARD COMPANY.—*Frank U. Hayes*, sales manager of the Bullard Company, has been elected a director to succeed *E. P. Blanchard*, formerly director of sales, who retired on September 29 after 30 years with the company.

◆

A. M. BYERS COMPANY.—*A. D. Sheere* has been appointed manager of the San Francisco, Cal., division of the A. M. Byers Company, to succeed *P. D. Tabler*,

**A. D. Sheere**

who has retired. Mr. Sheere joined the Byers firm in 1924 and formerly was manager of the Houston, Tex., division. *N. L. Brown*, formerly field service engineer with the St. Louis, Mo., division, succeeds Mr. Sheere in Houston. Mr. Brown joined the organization in 1940.

**N. L. Brown**

◆

AMERICAN AIR FILTER COMPANY.—*John Hellstrom*, vice-president of the American Air Filter Company, Louisville, Ky., has been transferred to San Francisco, Calif., as manager of the newly-created Pacific division, which includes California, Oregon, Washington, Idaho, Montana, Utah, Arizona, New Mexico and western Texas.

Business activities of both American Air Filter and the Herman Nelson division, of Moline, Ill., in Pacific territory, will be under his direct supervision. *Robert H. Walpole, Jr.*, formerly engineering supervisor of the dust and fume control division at San Carlos, Calif., will be one of Mr. Hellstrom's assistants.

◆

UNION CARBIDE & CARBON CORP.—The Union Carbide & Carbon Corp., has announced the formation of the Oxweld Railroad Service Division, which will conduct the business of the Oxweld Railroad Service Company. The latter company has been dissolved, and all of its assets have been transferred to its parent corporation.

◆

HYSTER COMPANY.—*Robert F. Moody* has been appointed assistant sales manager in the eastern division of the Hyster Company, Portland, Ore. Mr. Moody will maintain headquarters in Peoria, Ill.

The *French Mill Supply Corporation*, 640 Varick street, Utica, N. Y., has been designated by the Hyster Company to sell and service Hyster trucks in 16 counties of central New York state. *Speer & Co.*, 7824 Hamilton road, Mt. Healthy, Cincinnati, Ohio, has taken over sale and service of Hyster industrial handling equipment in southwestern Ohio, eastern Indiana and northern Kentucky. *A. Burns Speer* and *Charles W. Mayer*, both formerly connected with the Equipco Sales Company, Hyster's truck dealer in Pittsburgh, Pa., are in charge of the new company.

◆

COOPER-BESSEMER CORPORATION. — For several months *John Fulleman*, authority on engine supercharging and centrifugal compressor design, has been at work with the Cooper-Bessemer engineering staff coordinating a broad engine development under way at its Mt. Vernon, Ohio, headquarters plant.

◆

PYLE-NATIONAL COMPANY.—*Robert P. Underwood* has been appointed sales engineer of the Pyle-National Company, with headquarters at the main plant in Chicago. Mr. Underwood will cover all railroads in the United States.

◆

BINKS MANUFACTURING COMPANY.—The Binks Manufacturing Company has purchased a new plant at 4915 Pacific boulevard, Los Angeles, Calif., with occupancy scheduled for the end of October. It will be operated under direction of *J. E. Roche*, manager of the west coast division, covering California, Oregon, Washington, Arizona, Utah, Nevada and Idaho.

◆

DE VILBISS COMPANY.—*Emil F. Frey*, assistant sales manager of the De Vilbiss Company, has been appointed director of sales promotion and advertising. *Henry M. Kidd*, assistant sales manager, has been appointed sales manager of spray equipment sales.

◆

EDGEWATER STEEL COMPANY.—*J. H. Perry, Jr.*, formerly representative in Philadelphia, Pa., for the Edgewater Steel Company, has been appointed a district manager, with headquarters as before at

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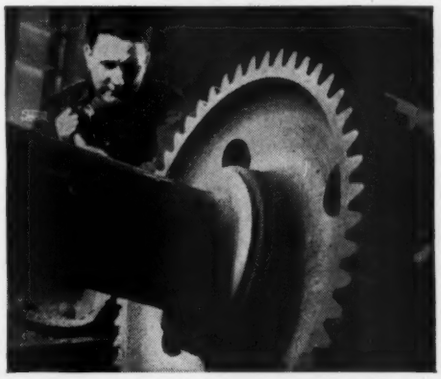

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989 Broad Street Station building, Philadelphia. Mr. Perry will be responsible for sales in the Philadelphia and Washington, D. C., territories, as well as general supervision of the Baltimore, Md., office. *M. A. Carlton* will continue as representative in the Baltimore territory.

◆

REED ROLLER BIT COMPANY.—The Cleco division of the Reed Roller Bit Company, Houston, Tex., has appointed the *Granite City Tool Company*, Box 368, St. Cloud, Minn., as distributor of Cleco products in that area.

◆

GENERAL MOTORS CORPORATION.—*Harold H. Dice*, director of test and inspection of the Electro-Motive Division of the General Motors Corporation, La Grange, Ill., has been appointed administrative assistant. *John H. Anderson*, assistant director of test and inspection, succeeds Mr. Dice as director of test and inspection.

◆

SOCONY-VACUUM OIL COMPANY.—*J. G. Christopher*, eastern railroads' sales representative in the national accounts department of the Socony-Vacuum Oil Company, has retired. *M. G. DeForest*, acting sales engineer for railroads, succeeds Mr. Christopher. *G. A. Hope* of the gasoline and fuel oil department succeeds Mr. DeForest as acting sales engineer.

### Obituary

WILLIAM T. HANNA, president of the Hanna Stoker Company, died recently at his home in Cincinnati, Ohio, following a brief illness. Mr. Hanna was born on April 13, 1868. He started working on development of locomotive stokers in 1905, and was continuously engaged in that business until the time of his death.

◆

A. T. BREMSER, chief engineer of Diesel engine equipment, Scintilla Magneto division, Bendix Aviation Corporation, died on September 28. Mr. Bremser, a graduate of an engineering college in Germany, resided in the United States since 1923. From 1927 to 1932 he was engaged in development of the first lightweight, high-speed Diesel engine at the Treiber Diesel Engine Corporation, Camden, N. J. In 1932, he was active in planning and design of Diesel locomotive engines as assistant chief engineer of the DeLaVergne Engine Company (Baldwin Locomotive Works). In 1935 he worked on the design of the first streamlined Diesel road locomotives ordered by the Gulf, Mobile & Northern (now Gulf, Mobile & Ohio). He joined Scintilla in March, 1937.

◆

HARRY F. LOWMAN, special representative of the Vapor Heating Corporation, died on October 18 in Washington, D. C. Mr. Lowman had been associated with Vapor for 37 years.

◆

EDWARD W. KAVANAGH, manager, sales and service, railway division, southern region, of the Manganese Steel Forge Company, Philadelphia, Pa., died recently after a short illness. Before his association with

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the Manganese Company he was for over 20 years sales manager of the Ulster Iron Works, Dover, N. J.

◆

JOSEPH A. QUEENEY, eastern sales representative of the National Seating Company, died on September 29. He was 68 years old.

# PERSONAL MENTION

### General

H. M. MCINNES, assistant superintendent motive power of the Chesapeake & Ohio at Grand Rapids, Mich., has been appointed assistant superintendent motive power and equipment, with headquarters at Grand Rapids.

E. A. KUHN, superintendent motive power of the Chesapeake & Ohio at Grand Rapids, Mich., has been appointed superintendent motive power and equipment, with headquarters in Grand Rapids.

W. R. REID, master mechanic of the Chesapeake & Ohio at Saginaw, Mich., has been appointed superintendent locomotive department at Grand Rapids.

GEORGE M. HARDING, mechanical engineer of the Canadian National, has been appointed chief mechanical engineer of the system with headquarters as before at Montreal, Que. Mr. Harding was born at Stratford, Ont., and is a graduate of the University of Manitoba. He began his career in 1924 as a blueprint boy in the Transcona, Man., motive power shops of the Canadian National, and became a ma-

George M. Harding

chinist apprentice in 1926. As a machinist he went to Kamsack, Sask., where he served two years. In 1938 he became material inspector at Winnipeg, Man.; apprentice class instructor at Transcona in 1945; mechanical inspector and engine inspector one year later, and mechanical engineer at Montreal in 1948. His service with the C. N. was interrupted in 1943 when he

served with the Royal Canadian Naval Volunteer Reserves.

OSCAR LEONARD HOPE, who has been promoted to mechanical superintendent, Southern district, of the Missouri Pacific Lines, with headquarters at St. Louis, Mo., as announced in the November issue, was born on September 4, 1902, in Pine Bluff, Ark. Mr. Hope graduated from high school in his home town in 1917, and in 1918 became a machinist apprentice on the St. Louis Southwestern at Pine Bluff. He served as a machinist for the St. Louis-San Francisco at Sherman, Tex., from May, 1923, to July, 1923, and for the Union Pacific at Salina, Kan., from July, 1923, to September, 1923. Subsequently he joined the M. P. as a machinist, serving successively at Hoisington, Kan., St. Louis and Little Rock, Ark. From 1928 to 1934 Mr. Hope served in various capacities with the M. P. at Little Rock, later being assistant foreman, foreman, night general foreman and general foreman. In August, 1946, he was appointed master mechanic of the central Kansas-Colorado divisions at Osawatomie, Kan.

W. J. FULTON, master mechanic of the Pittsburgh and Conemaugh divisions of the Pennsylvania at Pitcairn, Pa., has been appointed superintendent motive power—Diesel of the Western region, with headquarters at Columbus, Ohio.

E. T. HURLEY, chief chemist of the Canadian National at Montreal, Que., has been appointed assistant controller of tests and materials research, at Montreal.

G. S. WEBB, superintendent of motive power of the former Southern grand division of the Pennsylvania at Wilmington, Del., has been appointed superintendent of motive power of the Eastern region, with headquarters at Philadelphia, Pa.

WALTER O. TEUFEL, general superintendent of the Northern grand division of the Pennsylvania at Buffalo, N. Y., has been named assistant chief of motive power at Philadelphia, Pa., to succeed *R. G. Bennett*, who has been granted a leave of absence until his retirement becomes effective on January 1, 1951.

C. W. WHISTLER, superintendent motive power of the former Eastern Ohio grand division of the Pennsylvania, has been appointed superintendent motive power of the Central region, with headquarters as before at Pittsburgh, Pa.

L. E. ABBEY, division master mechanic of the Canadian Pacific at Kenora, Ont., has been appointed assistant superintendent-division master mechanic at Penticton, B. C.

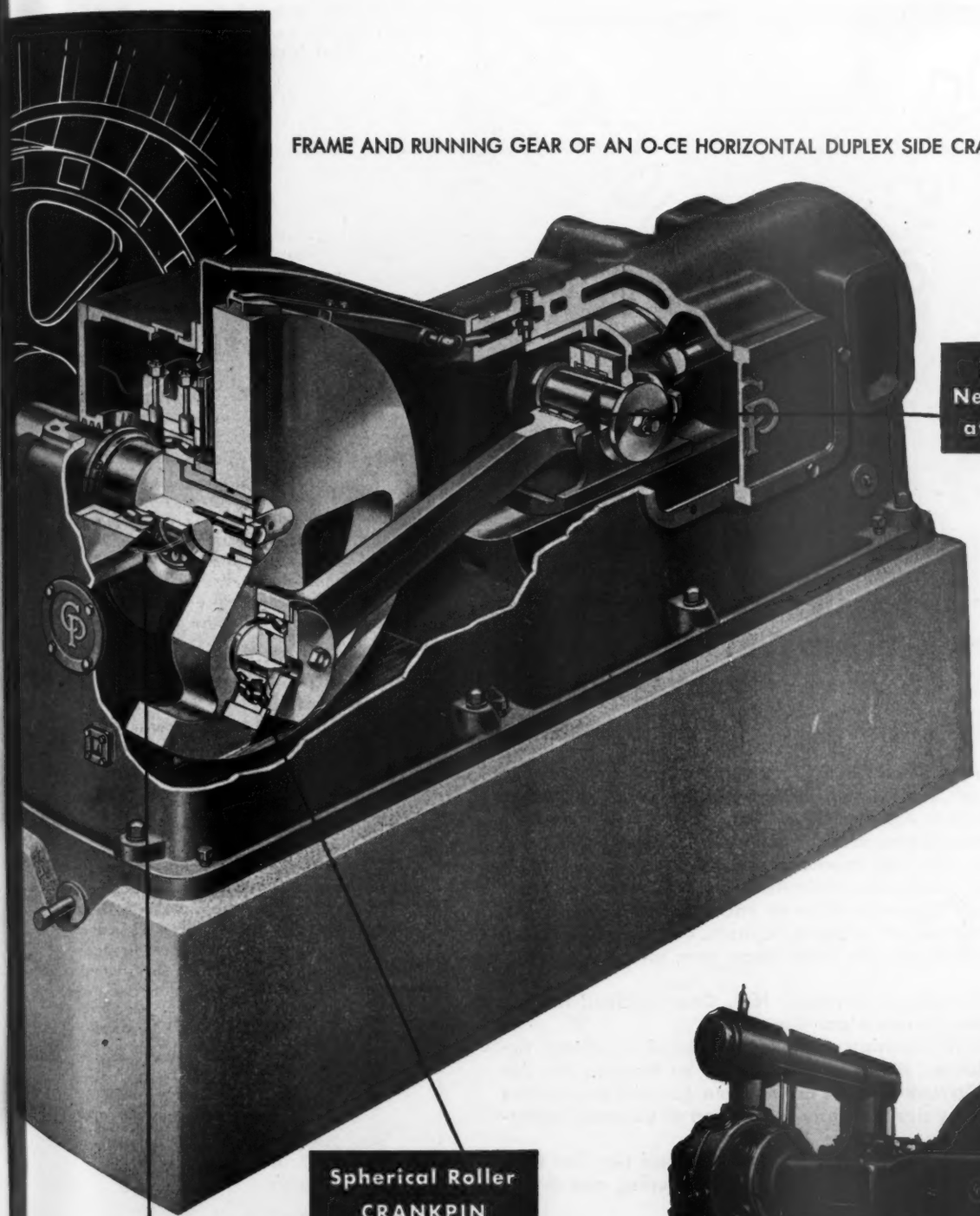
R. P. RENNIE, assistant chief chemist of the Canadian National, has been appointed chief chemist at Montreal, Que.

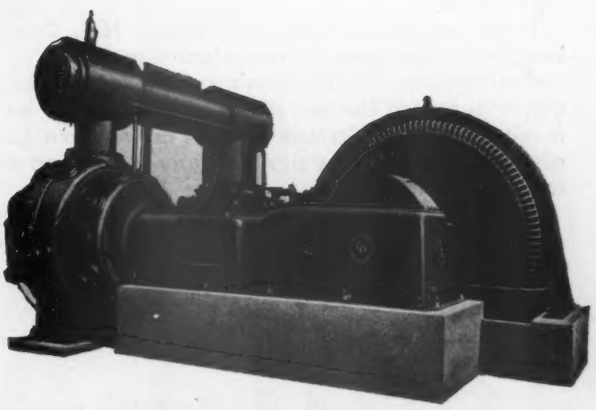
**Boiler Shop**

S. E. WALDIS, assistant boilermaker foreman of the Norfolk & Western at Portsmouth, Ohio, has been appointed boilermaker foreman.

M. E. SMITH, night boilermaker fore-

FRAME AND RUNNING GEAR OF AN O-CE HORIZONTAL DUPLEX SIDE CRANK COMPRESSOR



CLASS O-CE TWO-STAGE
MOTOR-DRIVEN COMPRESSOR

*Write for Bulletin 726-5*

CHICAGO PNEUMATIC
TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

man of the Norfolk & Western at Williamson, W. Va., has been appointed assistant boilermaker foreman at Portsmouth, Ohio.

H. D. HYPES, gang leader of the Norfolk & Western at Portsmouth, Ohio, has been appointed night boilermaker foreman at Williamson, W. Va.

### Car Department

HOWARD J. LOWMAN has been appointed assistant foreman car repairs of the Southern at Spencer, N. C.

### Diesel

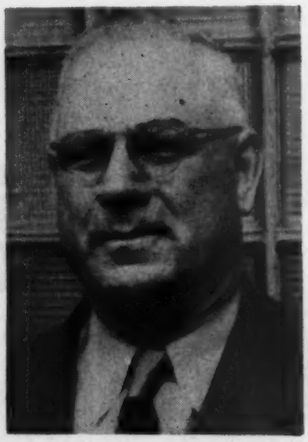
J. S. BELL, superintendent of motive power of the former Eastern Pennsylvania grand division of the Pennsylvania, has been appointed superintendent of motive power—Diesel of the Eastern region, with headquarters as before at Harrisburg, Pa.

J. W. HORINE, JR., assistant electrical engineer of the Pennsylvania, has been appointed general superintendent, motive power—Diesel, with headquarters as before at Philadelphia, Pa. This is a new position. Mr. Horine will supervise Diesel maintenance over the entire system.

J. E. WIGHTMAN, JR., superintendent motive power of the old Western Pennsylvania grand division of the Pennsylvania, has been appointed superintendent of motive power—Diesel of the Central region, with headquarters as before at Pittsburgh, Pa.

### Electrical

WILLIAM C. COX, who has been appointed electrical engineer, Pere Marquette district of the Chesapeake & Ohio at Grand Rapids, Mich., as reported in the November issue, was born in West Branch, Mich., on August 23, 1887. He studied engineering at Michigan State College,



**William C. Cox**

and prior to entering railroad service was employed as an electrical engineer with the Portland (Ore.) Light & Power Co., the Wilson Mining Company, Kokomo, Colo., and the Holly (Mich.) Light & Power Co. In December, 1914, he entered the employ of the Pere Marquette (now P. M. district, C. & O.) as lead electrician at its Ionia shops. Mr. Cox was appointed

*MASTER MECHANIC:*
*"Gould's periodic inspection service and technical assistance help us keep our battery maintenance costs low."*

*CHIEF CAR INSPECTOR:*
*"Our cars are more available for train make-up since we standardized on Gould."*

*ELECTRICAL ENGINEER:*
*"Gould's 'Z' plate design increases battery life... gives us lowest monthly cost based on service life."*

*ELECTRICAL YARD FOREMAN:*
*"Gould batteries require less yard charging ...they maintain capacity longer after charging!"*

# They All Prefer GOULD-EQUIPPED CARS!

*ELECTRICIAN:*
*"Gould lead insert covers cut cleaning and corrosion."*

**There's nothing like Gould Batteries to boost the availability of cars . . . and to cut the cost of battery maintenance!**

**The extra service, extra reserve capacity of these batteries are the result of Gould's new "Z" Plate. Look at these proven features: 96% of its entire working surface is *regenerative* power-producing material; the grid itself is 66% more resistant to deterioration; grid porosity has been reduced 85%! No wonder they *all* prefer**

**GOULD "Z" PLATE BATTERIES**

**America's Finest Car Lighting and Air Conditioning Batteries!**

electrical supervisor in charge of passenger car lighting at Bay City, Mich., in 1915, and three years later became power plant engineer at Wyoming shops, Grand Rapids.

K. H. GORDON, assistant electrical engineer of the Pennsylvania at Philadelphia, Pa., retains the title of assistant electrical engineer, succeeding J. W. Horine.

S. V. SMITH, assistant engineer in the office of the electrical engineer of the Pennsylvania at Philadelphia, Pa., has been appointed assistant electrical engineer, succeeding K. H. Gordon.

### Master Mechanics And Road Foremen

J. J. RABY, division master mechanic of the Canadian Pacific at Saskatoon, Sask., has been transferred to the position of division master mechanic at Kenora, Ont.

C. J. WILLIAMS, assistant master mechanic of the Southern Pacific at West Oakland, Calif., has been appointed master mechanic at Bakersfield, Calif.

RICHARD E. FRANKLIN, general foreman of the Southern at Ludlow, Ky., has been appointed master mechanic at Meridian, Miss.

B. S. CARTER, general foreman locomotive repairs of the Chicago, Burlington & Quincy at Galesburg, Ill., has been appointed assistant master mechanic of the Galesburg-Creston divisions, with headquarters at Galesburg.

O. T. BUTCHER, master mechanic of the Chesapeake & Ohio at St. Thomas, Ont., has been appointed master mechanic at Saginaw, Mich.

J. W. TRAGNITZ, master mechanic of the Illinois Central at Vicksburg, Miss., has been appointed general master mechanic at Chicago.

R. J. CHINN, assistant to the general superintendent of equipment of the Illinois Central, has been appointed master mechanic at Vicksburg, Miss.

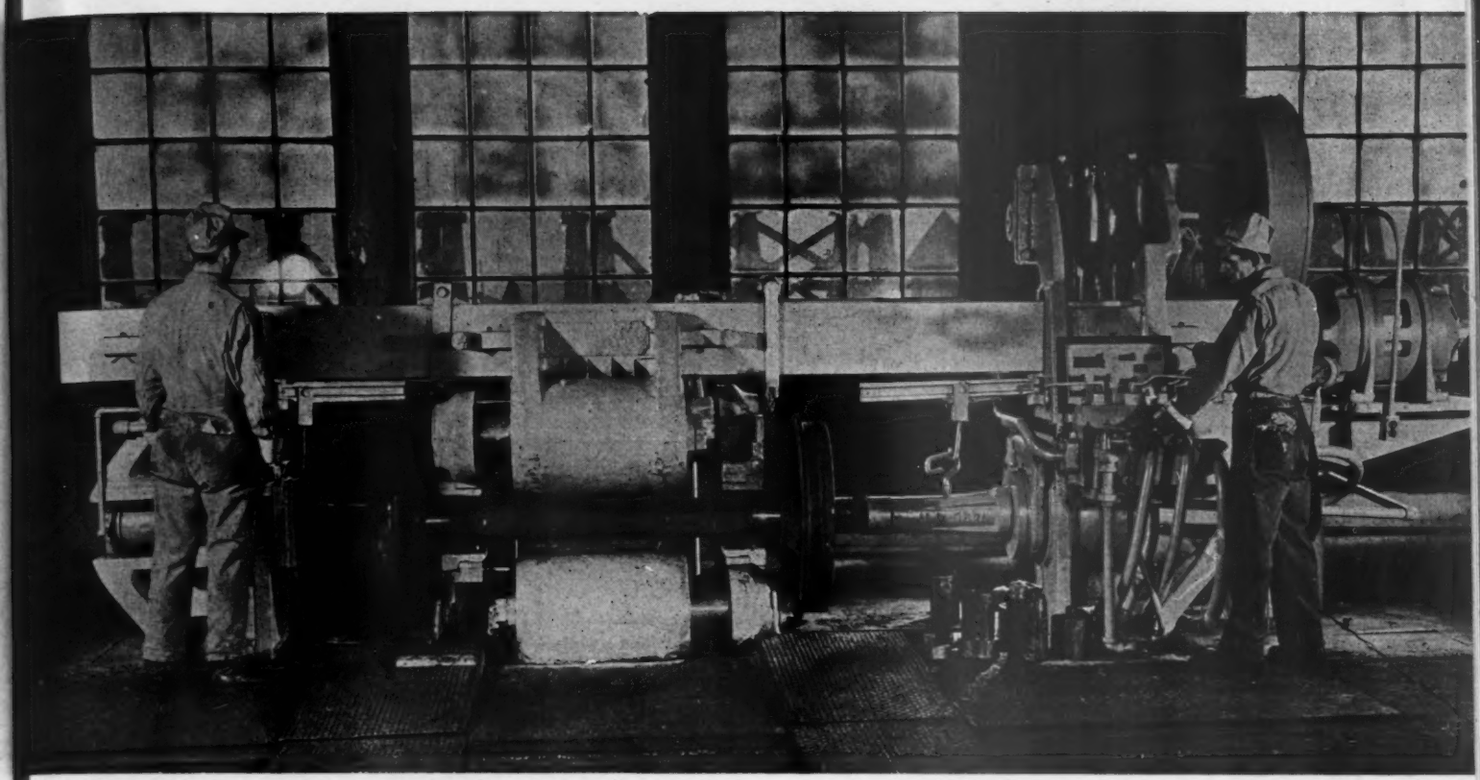
A. G. GEBHARD, master mechanic of the Illinois Central at Chicago, has resigned.

J. R. VANNORTWICK, assistant master mechanic of the Galesburg-Ottumwa-Creston divisions of the Chicago, Burlington & Quincy, at Galesburg, Ill., has been appointed acting terminal master mechanic at Chicago.

J. J. QUINN, assistant master mechanic of the Pittsburgh and Conemaugh divisions of the Pennsylvania, has been appointed master mechanic of the Lake division with headquarters at Cleveland, Ohio.

W. S. PLUMMER, master mechanic of the Lake division of the Pennsylvania at Cleveland, Ohio, has been transferred to the Pittsburgh and Conemaugh divisions, with headquarters at Pitcairn, Pa.

L. P. OBERKAMP, assistant master mechanic of the Southern Pacific at Los Angeles, Calif., has been promoted to master mechanic at Dunsmuir, Calif., suc-



CHAMBERSBURG DUPLEX WHEEL PRESS STRIPPING WHEELS AT B. & O. CENTRALIZED CAR WHEEL SHOP, GLENWOOD, PA.

**Because the floor-to-floor wheel-stripping time of the Chambersburg Duplex Wheel Press—frequently clocked at 42 seconds—is unequalled by any other method, it more than meets the requirements of the centralized wheel shop.**

**CHAMBERSBURG ENGINEERING COMPANY, CHAMBERSBURG, PA.**

STRIPPING TWO CAR WHEELS SIMULTANEOUSLY AT N.Y.O. & W.R.R. SHOPS, MIDDLETOWN, N. Y.

ceeding H. T. ANKERSON, who has been recalled to military service.

OLIVER COCHRAN, general air-brake inspector of the Canadian Pacific at Winnipeg, Man., has been appointed division master mechanic at Saskatoon, Sask.

JOHN L. CHRISTIAN, master mechanic of the Southern at Meridian, Miss., has been appointed master mechanic at Birmingham, Ala.

L. A. DIXON, assistant master mechanic, Fort Wayne division, of the Pennsylvania, has been appointed acting master mechanic, Chicago division.

JOHN O. ROSE, general foreman at the Corbin (Ky.) shops of the Louisville & Nashville, has been advanced to master mechanic at Corbin, succeeding the late *H. B. Feather.*

G. R. THOMAS, assistant superintendent-division master mechanic of the Canadian Pacific at Penticton, B. C., has retired.

### Shop and Enginehouse

NORMAN WOOLLEY, shop foreman at the Winnipeg, Man., enginehouse of the Canadian Pacific, has been appointed general air-brake inspector at Winnipeg.

HAROLD J. WEBER has been appointed assistant enginehouse foreman (night) of the Southern at New Orleans, La.

ANTHONY C. MILLER has been appointed assistant foreman enginehouse (night) of the Southern at Charleston, S. C.

ALBERT N. ODEN, general foreman of the Southern at Princeton, Ind., has been appointed general foreman at Ludlow, Ky.

SEESSEL H. ALLBRIGHT, general foreman of the Southern at Pinners Point, Va., has been appointed general foreman at Hamburg, S. C.

J. F. HUNT, supervisor of Diesel-electric locomotives on the Western region of the Pennsylvania, has been appointed assistant superintendent of the Altoona (Pa.) works.

E. A. CAMPNEY, general supervisor of locomotive maintenance of the Baltimore & Ohio at Baltimore, Md., has been appointed supervisor of lubrication.

SAMUEL E. MAVITY, assistant enginehouse foreman (night) of the Southern at New Orleans, La., has been appointed general foreman at Princeton, Ind.

### Obituary

FRANK H. CLARK, who was general superintendent of motive power of the Baltimore & Ohio from 1911 to 1919, died on November 3 in New Orleans, La., at the age of 87. Mr. Clark was technical adviser to the Ministry of Communications of the Republic of China from 1919 to 1927, when he established his own business as consulting engineer. Mr. Clark was a past president of the Western Railway Club, the Master Car Builders Association and the American Railway Master Mechanics Association.

# First Again

with a **NEW** Type of **CAB HEATER** that's *"Built to Last"*


## *Introducing to You . . .*

## THE NEW KYSOR COMBINATION LOW PRESSURE STEAM AND HOT WATER HEATER

This new re-circulating air type heater eliminates objectionable features of the ordinary cab heater! It is made in two units — one being placed under the seat of the engineer and the other under the seat of the fireman.

It is built into the floor, instead of in the bulkhead of the engine — yet is easily available for servicing, if required.

It is designed for the particular locomotive in which it is installed, and will therefore be properly co-ordinated. Also — its separate defosting motor will be adjusted to eliminate any frosting condition on the windshield of the cab.

Send for Bulletin describing this new type Kysor Cab Heater. It's the last word and it's —

*"Built to Last"*

*Now the* STANDARD HEATER *for* AMERICAN LOCOMOTIVE CO. *and* THE BALDWIN LOCOMOTIVE WORKS

25 ANNIVERSARY KYSOR HEATER CO. CADILLAC, MICHIGAN "BUILT TO LAST"

KYSOR HEATER COMPANY Cadillac, Michigan

CANADIAN REPRESENTATIVES. RAILWAY & POWER ENGINEERING CORP.

NEW GLASGOW · MONTREAL · NORANDA · NORTH BAY · TORONTO · HAMILTON · WINDSOR · WINNIPEG · EDMONTON

# NEW DEVICES

(*Continued*)

## Oil-Resistant Wire

A new gasoline- and oil-resistant wire, called Geotrol, has been announced by General Electric's Construction Materials Department. This wire, which is the first non-lead covered wire of its type to be listed by the Underwriters' Laboratories, Inc., is designed for wiring in conduit to gas pump islands at filling stations and for lighting circuits at refineries and similar places where oil and oil products are likely to cause deterioration of non-resistant wires. The elimination of a lead covering gives a considerable saving in cost, weight, and installation time.

Conductors are insulated with vinyl compound and sheathed in a jacket that is highly resistant to petroleum products. The insulated conductors are available in black, white, red, green, orange, blue and yellow. Geotrol is available with solid conductors in sizes 14, 12 and 10 A.w.g.

## Extension Cord Reel

Industrial Products Company, Philadelphia, Pa., announced a heavy-duty cord

reel carrying approval of the Underwriters' Laboratories. Furnished with either 25 ft. or 45 ft. of heavy duty rubber covered cord, it is available with various types of regular and vaporproof hand lamps at the cord end. It may also be furnished with a connector plug, or without any wiring device if desired.

A free-moving swivel mounting prevents binding and kinking and fraying of the cord. The reel has constant retracting speed, and locks or releases at any cord length.

The sealed-in lubricant requires no attention, and the universal bracket allows for ceiling or wall mounting.

## High Slip Upholstering Material

Elastic upholstering material, with a high slip finish, has been developed by the United States Rubber Company, New York 20, for use in automobiles, busses, trucks, railroad cars and furniture.

It is made of a vinyl plastic that will stretch in every direction. It is easy to tailor, stays permanently soft and pliable and combines elastic supporting fabrics and an elastic plastic coating.

Called elastic Naugahyde, it has been adapted by several car manufacturers for upholstering 1951 passenger cars. The product is sold in rolls 30 to 40 yd. long and 47 in. wide. Colors are on a special order basis, although five are already in the stock line. Patterns can be multiple cut with electric knives. Because of the stretchy construction, slightly smaller patterns can be used with resultant savings in material.

It is easy to handle, needs no wetting, special tools, tape or cement for application. It does not bag or wrinkle and it is highly resistant to scuffing and tearing. It can be washed with soap and water, and will not crack or flake. The product is not harmed by oils, greases, gasolines or alkalis.

# knowledge plus experience

*. . . these have given him the surest instrument*

*. . . faith in himself*

*The BIDDLE business was and is being built on the faith of its customers in our ability to supply high quality instruments and personal service.*

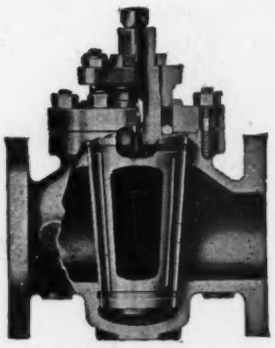
*BIDDLE instruments enjoy the wide acceptance they do, because they have been dependable through long periods of service . . . They have been their own best salesmen. BIDDLE service files bear mute testimony to instrument after instrument that has served generations of workers . . . has amortized its purchase price long ago . . . and upheld the judgment of its original purchaser. Price tags and "specs" can't possibly reflect the quality or performance of a fine instrument or the integrity of its maker . . .*

**JAMES G. BIDDLE CO.**
1316 ARCH STREET—PHILADELPHIA 7, PA.

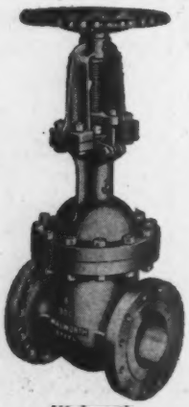
*Electrical Testing, Speed Measuring Instruments, Laboratory and Scientific Equipment—Established Since 1895*

MEGGER® INSULATION AND RESISTANCE TESTERS • MEGGER GROUND RESISTANCE TESTERS • FRAHM® RESONANT REED TACHOMETERS • FRAHM RESONANT REED FREQUENCY METERS • JAGABI® TACHOMETERS AND SPEED INDICATORS • JAGABI LUBRI-TACT® RHEOSTATS

# ● VALVES
# ● PIPE FITTINGS

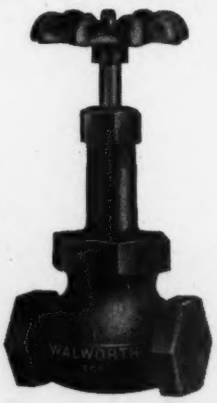


Walworth
Lubricated Plug Valve



Walworth
Steel Gate Valve

Walworth
Iron Body Gate Valve



Walworth
"500 Brinell" Bronze Globe Valve

Walworth
Iron Body Saddle Gate Valve


Walworth
Cast Steel Flanged Fittings

Walworth manufactures a *complete line* of valves and pipe fittings: all made to the highest standards of quality, both as to dimensional accuracy and metallurgical properties. In design, construction, and performance, Walworth products reflect more than a century of experience in the manufacture of quality valves and fittings.

Your Walworth distributor will give you full information on the *complete line* of Walworth steel, iron, and bronze, and special alloy valves and pipe fittings; also Walworth Lubricated Plug Valves, and Walseal* valves, fittings and flanges. Ask for this information today.

*Patented—Reg. U. S. Pat. Off.

# WALWORTH
## valves and fittings
**60 EAST 42nd STREET, NEW YORK 17, N. Y.**

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD


***You can cut hopper shoppings in half by using aluminum for repairs . . . because ALUMINUM LASTS***

Are rusted-out hopper cars crowding your repair shops? Demanding more than their share of your maintenance dollar? You can cut this expense sharply in the future by repairing cars with Alcoa Aluminum. The same corrosive coal acids that bite through heavy metal do not harm aluminum. When you repair with aluminum, you repair *for keeps!* Use standard shop methods. And remember, too—aluminum saves tons of dead weight per car, needs no painting.

**Get the facts and figures on Aluminum repairs for your cars**

Investigate the advantages of revitalizing your hoppers with aluminum. Our engineers will gladly analyze costs and material requirements for your type of car. Call your nearby Alcoa Sales Office. Or write ALUMINUM COMPANY OF AMERICA, 1818M Gulf Bldg., Pittsburgh 19, Pa.

For local source of supply on ALCOA Products, look under *ALUMINUM* in your Classified Telephone Directory

**ALCOA** FIRST IN ALUMINUM ...THE METAL THAT *LASTS*

ALCOA ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT-MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

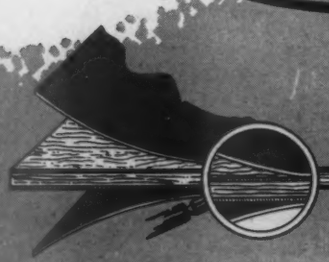
DOORS • SIDE PANELS
BULKHEADS and PARTITIONS
in This Luxury Car are *73% Lighter*
Than Standard Steel Construction . . .

## ...because they are MET-L-WOOD

METAL BONDED TO PLYWOOD

● Met-L-Wood, used in passenger cars, locomotives and baggage cars cuts deadweight to a minimum consistent with specified strengths, stiffnesses and durability. As an example, Type 2P2-3/8" Met-L-Wood, used in side panels and partitions has the stiffness of 1/4" steel plate—yet weighs only 2.6 lbs./sq. ft. as against 10 lbs./sq. ft. for 1/4" steel plate!

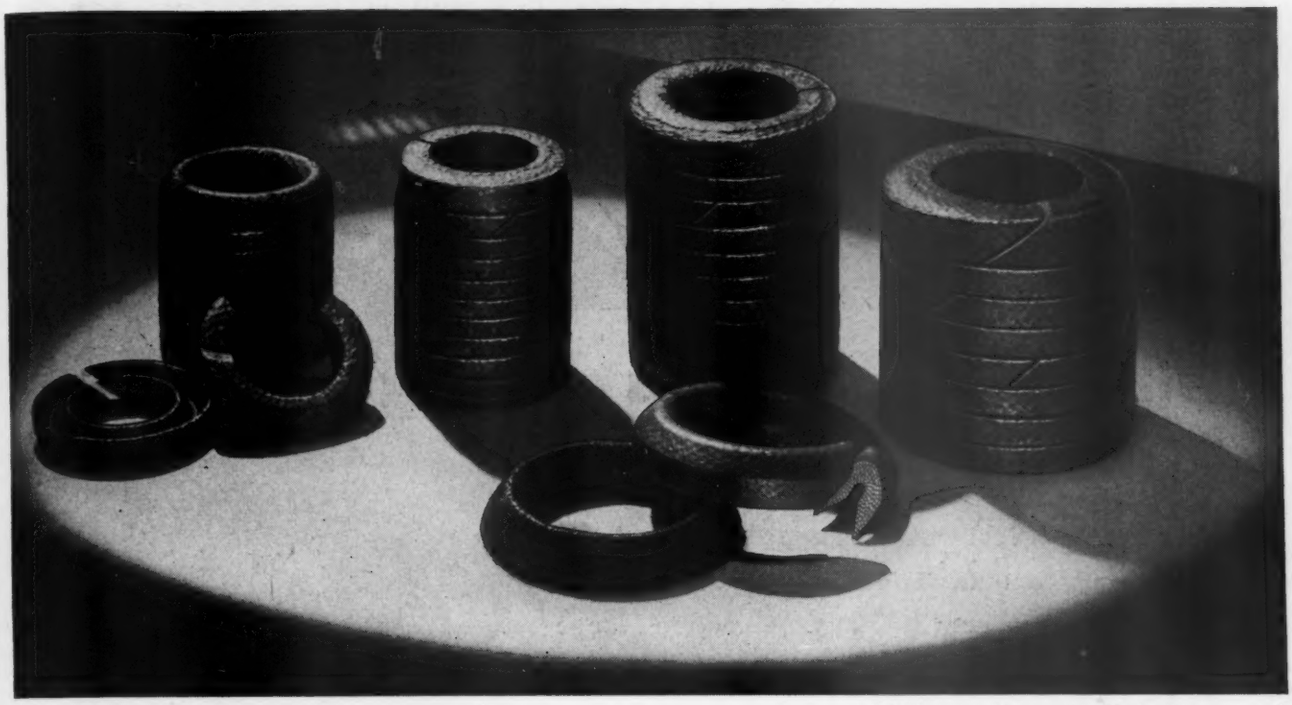
Whether you require prefabricated Met-L-Wood units to your specifications, or can use stock sizes and finishes, the basic utility and economy of Met-L-Wood for railroad rolling stock construction is worth investigating . . . today. Write for details on your specific requirements. Our engineering staff will gladly assist you in adapting Met-L-Wood versatility to your needs.



**MET-L-WOOD CORPORATION**

6755 West 65th Street, Chicago 38, Illinois

**MET-L-WOOD** · *STRONG... LIGHT... Smooth Finish... Sound Deadening... Fire-Resisting... Insulating*



GARLOCK 530 *Chevron* Throttle Packing.

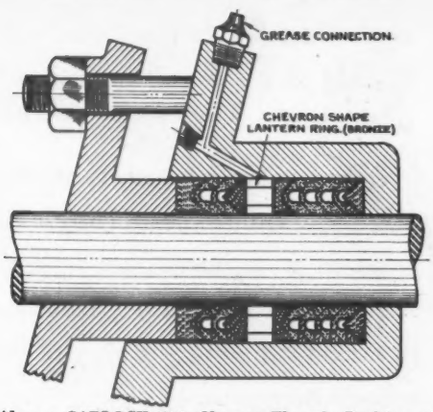
# CHEVRON

## Throttle Packing

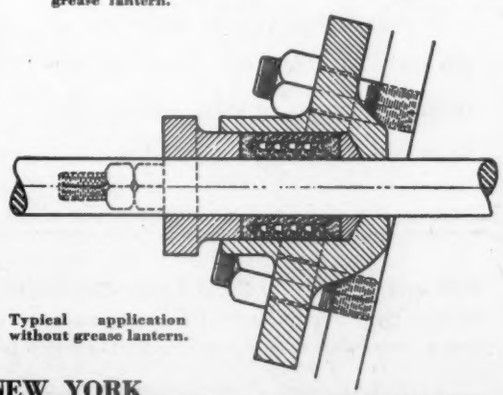
### —*for Efficiency and Economy*

The use of Garlock *Chevron* locomotive throttle packing has increased efficiency and has effected substantial reductions in packing costs on many railroads. The exclusive hinge-like construction of the *Chevron* rings allows the packing to expand and contract and reduces friction to a minimum. Very little gland pressure is required. The result is a leakless, easy-operating throttle.

When installed with a grease lantern ring and a connection for a grease gun, a lubricant can be injected into the stuffing box. This makes for longer packing life and increases the ease with which the throttle can be opened and closed. Standardize on *Chevron* for your locomotive throttles!



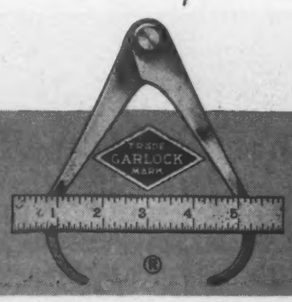

Above: GARLOCK 530 *Chevron* Throttle Packing with grease lantern.



Typical application without grease lantern.

**THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK**
**In Canada: The Garlock Packing Company of Canada, Ltd., Montreal, Que.**
***Branches in All Principal Railroad Centers***

# GARLOCK



# TAKES DOWN FLANGES PERFECTLY *in 20 minutes!*

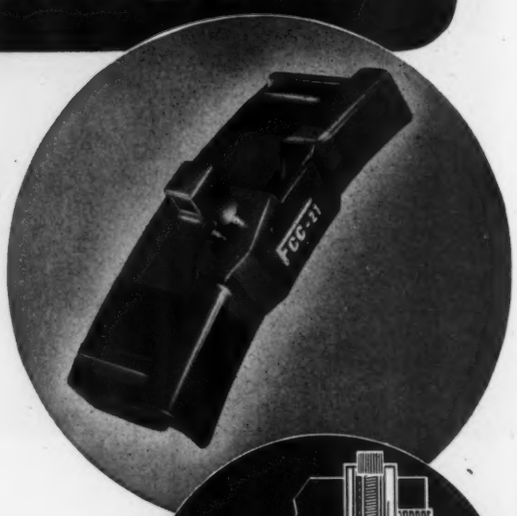
## Without Pulling Wheels or Laying-Up Your Diesels

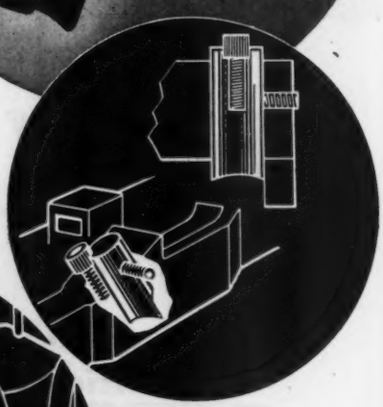
Your flanges are cut with a carbide tool—completely accurate in contour. This cutter is mounted, as illustrated, in our new FCC-21 Combination Flange Cutter.

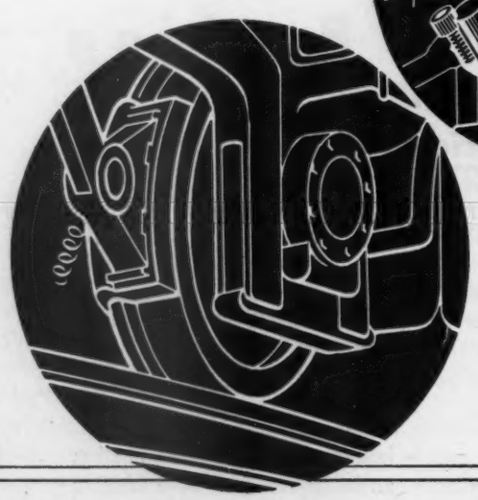
Taking down flanges is a quick and simple operation. Regular brake-shoes are replaced with the FCC-21 in a matter of minutes without disassembly of the brake rigging.

As your Diesel moves down the track, the cutter's stable angle results in a uniform smooth cut. Rate of feed of the carbide tool is in exact ratio to the turning of the wheels being cut.

Your flanges are reduced to proper limits, and your equipment is once again ready for service—IN 20 MINUTES.





The chip emerges in a continuous ribbon of uniform thickness.

**YOU ARE INVITED TO SEE A DEMONSTRATION**—This revolutionary new FCC-21 Cutter has the endorsement of Superintendents of Maintenance and Master Mechanics. Our field representative will gladly give you a personal demonstration or take you to see one. Write for information and descriptive bulletins.

*Serving the Railroad Industry for Fifty Years*

**WHEEL TRUING BRAKE SHOE CO.**

628 West Baltimore Ave., Detroit 2, Michigan

## amazing
## bronze stem gives
## years of extra service


* Trade Mark Registered

## 300,000
## OPENINGS AND CLOSINGS
## FROM LUNKENHEIMER'S
# *Miracle Metal*

Unbelievable? Perhaps, but Lunkenheimer's amazing new bronze stem metal has actually been tested at more than 300,000 openings and closings—the equivalent of years and years of rigorous service. Wear-test machines, carefully controlling torque and number of turns, have registered more than 300,000 cycles in the continuing tests—with live steam flowing through the valves. This stem has also been exhaustively tested under severe field conditions. Literally millions of stems have been placed in service, and not one has ever been returned due to wear failure. The remarkable stem metal, which has revolutionized all prior conceptions of valve stem life, is called Stemalloy*. It is a special-purpose bronze developed exclusively by Lunkenheimer, and is not commercially available. *Only Lunkenheimer valves* have the Stemalloy* stems. Ask your leading industrial distributor for information on the *complete* Lunkenheimer bronze valve line, or write The Lunkenheimer Co., Box 360Y, Cincinnati 14, Ohio.

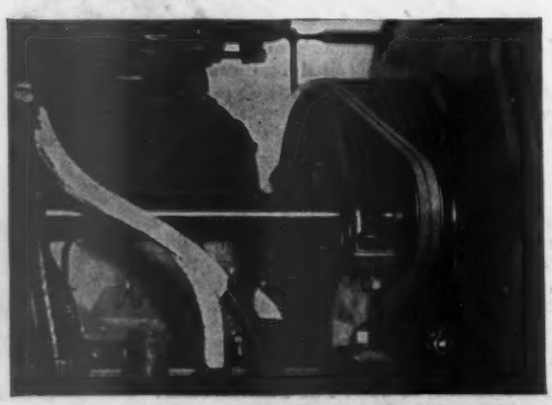
**BRONZE • STEEL • IRON**

# LUNKENHEIMER
THE ONE *Great* NAME IN VALVES

L-1050-9

# with Diesels it's Dayton Drives 9 to 1

Radiator Fan Drive



Traction Motor Blower Drive

## Dayton Endless V-Belts original equipment on 90% of all U. S.-built Diesels

*Product and Responsibility:* Two reasons for the overwhelming preference for Dayton Endless V-Belts by builders of Diesel locomotives.

Dayton V-Belts consistently outdrive and outlast other makes. A recent test of V-Belts under overload, by one of the world's largest manufacturers of Diesel locomotives, showed Dayton Belts had a power loss of less than 1% as against up to 5% for other makes. They are consistently dependable — 17 years as Railway "Specialists."

Actual operating performance of Dayton Belts—in the yard, on the line—is constantly checked by Dayton's Railway Field Engineers. Ask him how Dayton Belts can save you money on car-lighting, compressors, fans, traction motor blowers, auxiliary generator and exciter drives. Stocks at Dayton, New York, Chicago, and Los Angeles. Or write: *Railway Division, Dayton Rubber Co., Dayton, Ohio.*

RAILROAD V-BELTS by Dayton Rubber

**World's Largest Manufacturer of V-Belts**

DAYTON RUBBER COMPANY • DAYTON 1, OHIO